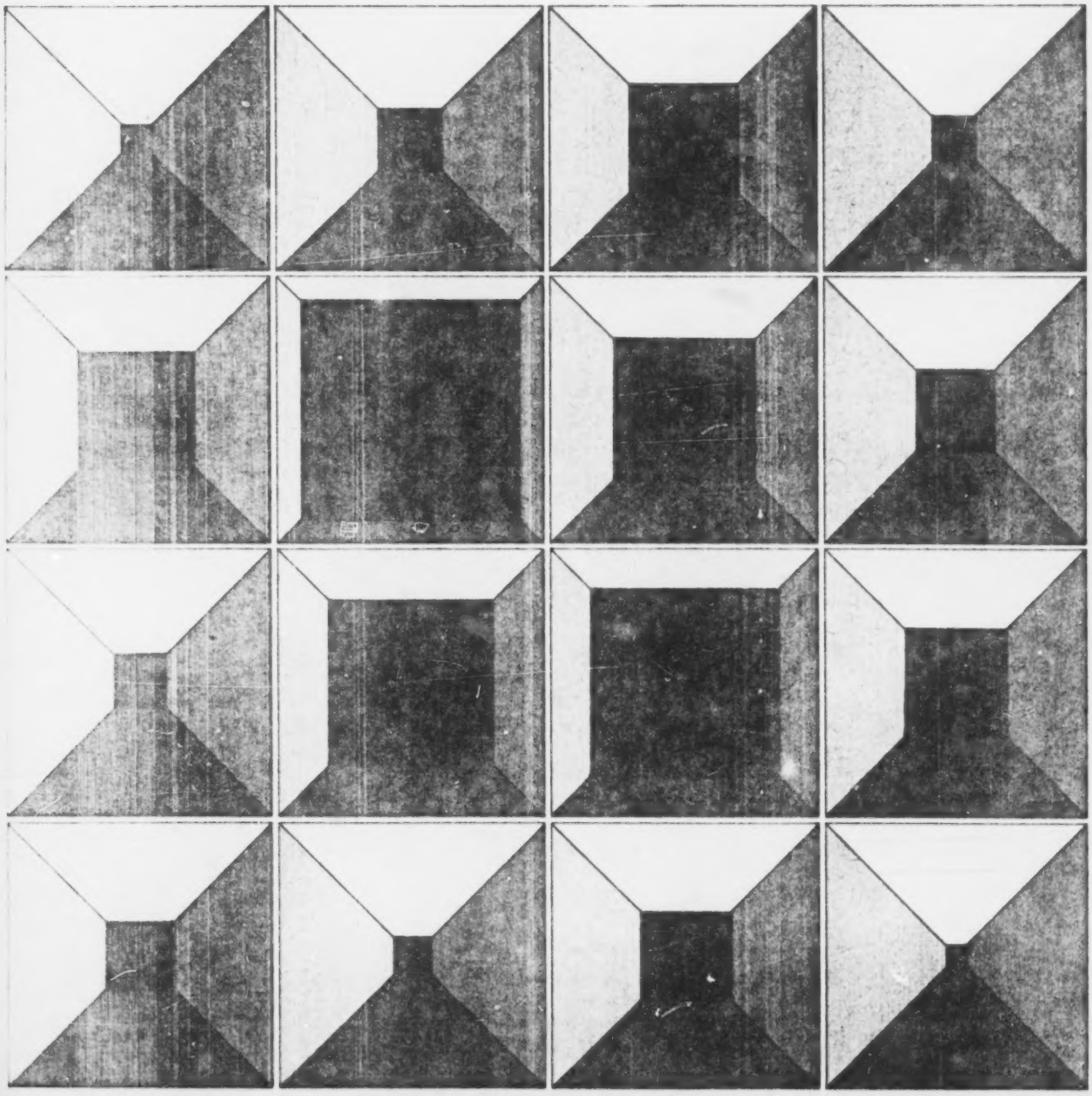
A CBO STUDY

Catastrophic Medical Expenses: Patterns in the Non-Elderly, Non-Poor Population

December 1982

Congress of the United States
Congressional Budget Office



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CATASTROPHIC MEDICAL EXPENSES:

PATTERNS IN THE NON-ELDERLY, NON-POOR POPULATION

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PREFACE

At the request of Congressman Charles Rangel, then Chairman of the Subcommittee on Health of the Committee on Ways and Means, the Congressional Budget Office (CBO) undertook an investigation of the problems of catastrophically expensive illness. This study, which examines catastrophic medical expenses in the non-elderly, non-poor, employed population, is the final product stemming from that effort. In keeping with CBO's mandate to provide objective analysis, this paper offers no recommendations.

Daniel Koretz of CBO's Human Resources and Community Development Division prepared the report under the supervision of Nancy M. Gordon and Paul B. Ginsburg. The Blue Cross-Blue Shield Federal Employees' Health Benefit Plan supplied the data, and data management and computer programming were provided by a group at the University of Colorado that included Cathleen Patrick, Herbert Schlesinger, Emily Mumford, and Gene Glass. Special thanks are due to James Hook of Blue Cross-Blue Shield, who patiently provided a great deal of help and information, and to Cathleen Patrick, whose expertise as a programmer was essential in handling the enormous volume of data and whose analytical assistance contributed immeasurably to this report. Thanks are also due to many others, including Reuben Snipper of CBO, Paul Eggers of the Health Care Financing Administration, and Wendell Primus of the staff of the Committee on Ways and Means for their helpful suggestions, and to the staff of Blue Cross-Blue Shield for their support. Francis Pierce edited the manuscript, and Rosetta Swann and Mary V. Braxton prepared the many drafts.

Alice M. Rivlin
Director

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SUMMARY

Unusually expensive illnesses--often called "catastrophic illnesses"--have been of concern to the Congress for many years. When not fully covered by insurance, these illnesses can produce unmanageable financial burdens for affected families. They comprise a substantial portion of total medical expenditures and impose serious costs on those not directly affected (governments, employers paying health insurance premiums, providers of health care, and other families). A variety of bills considered by the Congress during the past several sessions have contained provisions relating to catastrophic illness.[1]

This report analyzes high-cost illness in the non-elderly, non-poor population--about 53 million families.[2] The elderly and the poor were excluded because they are generally affected by different health programs and policies. The medical expenses included in the analysis were those conventionally covered by both private and public health insurance: inpatient acute-care hospital charges, surgical expenses, most outpatient care by physicians, prescription drugs, and very limited private nursing and home health care. Services used by some high-cost families--for example, long-term care in nursing homes or psychiatric hospitals

1. A large number of bills providing catastrophic health insurance coverage have been considered by the Congress. In addition, the recent consumer-choice bills--for example, H.R. 850, introduced by Congressman Gephardt and then-Congressman Stockman--include provisions that would increase private health insurance for catastrophic illness. Catastrophic illness has also been a legislative issue in a variety of other contexts, such as some Medicare proposals and consideration of the medical expense tax deduction.

2. Because families, rather than individuals, are the focus of this report, it excluded some, but not all, unemployed individuals. Families containing no full-time employed individual were excluded from the analysis. On the other hand, unemployed or part-time employed individuals who were spouses or minor dependents of full-time employed individuals (with earnings above a minimum explained in Chapter I) were included.

--which are excluded both from coverage by most health insurance, were also excluded from this report.

Throughout the report, families are classified as "high-cost" if their annual medical expenses exceeded one of four "catastrophic thresholds." These thresholds were $3,000, $5,000, $10,000, and $20,000.[3]

PRINCIPAL FINDINGS

Extent of High-Cost Illness in a Single Year

In the non-elderly, non-poor population, families exceeding any of the catastrophic thresholds in a single year are relatively rare, but they account for a sizable proportion of total medical expenses (see Summary Table 1). For example, only 5 percent of all such families exceed $5,000 in expenses in any given year, but those families account for half of total medical expenses. Moreover, the portion of those families' expenses above $5,000 comprises more than a fourth of all medical expenses.

Probability of High-Cost Illness Over Several Years

Although the proportion of non-elderly, non-poor families exceeding catastrophic thresholds within any one year is small, the proportion exceeding thresholds in at least one year during a several-year period is much larger. The proportion of families with expenses above $3,000 in any one year, for example, is only 11 percent, but 20 percent reach that level at least once in a two-year period, and fully one-fourth of all families exceed $3,000 at least once in a three-year period (see Summary Table 2). If the analysis was extended to longer periods of time, a substantially larger proportion of families would be found to exceed $3,000 at least once.

Expenses of High-Cost Families in Subsequent and Previous Years

In the population studied, families with expenses exceeding a threshold in a baseline year have expenses well above average in

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3. Unless otherwise noted, both the thresholds and expenditures were expressed in 1982 dollars. In some cases, however, this was not practicable--for example, in examining historical trends.

SUMMARY TABLE 1. PERCENT OF FAMILIES EXCEEDING VARIOUS LEVELS OF ANNUAL EXPENSE, PERCENT OF TOTAL MEDICAL EXPENDITURES ATTRIBUTABLE TO THEM, AND PERCENT OF EXPENSES ABOVE THE LEVELS

Level of Expense	Percent of Families Exceeding Level	Expenses of Families Exceeding Levels, as Percent of Expenses of All Families	
		Total Expenses of Families Exceeding Level	Only Expenses Above Level[a]
1,130[b]	23	[c]	[c]
3,000	11	68	40
5,000	5	50	26
10,000	2	28	13
20,000	0.5	14	5
30,000	0.2	[c]	[c]

a. Includes all families exceeding the level, but excludes the portion of their expenses that falls below the level.

b. Average annual expense.

c. Not estimated.

both previous and subsequent years as well. In the first year after exceeding a threshold, the expenses of high-cost families decline markedly from their level in the baseline year but remain about 130 to 610 percent above the average expenses of all families, depending on the threshold used (see Summary Table 3). In the second subsequent year, their expenses decline at a slower rate, remaining 110 to 340 percent above average. In the

SUMMARY TABLE 2. PERCENT OF FAMILIES WITH ANNUAL EXPENSES ABOVE CATASTROPHIC THRESHOLDS DURING PERIODS OF ONE TO THREE YEARS

	$3,000	$5,000	$10,000	$20,000
During Any One Year	11	6[a]	2	0.5
At Least Once During Two Years	20	10	3	0.8
At Least Once During Three Years	27	14	5	1.3

a. This percentage differs slightly from the corresponding percentage in Summary Table 1, because this analysis includes only families active for three consecutive years. The difference does not affect the conclusions drawn from this analysis.

aggregate, their expenses in the year before the baseline year closely mirror their expenses in the first subsequent year.

Many varied patterns of families' expenses underlie this aggregate pattern. The expenses of some high-cost families quickly return to average or even lower-than-average levels--because of either improved health or death. The expenses of other families remain above the threshold or even increase further. Depending on the threshold, from 12 to 27 percent of families that exceed a threshold in one year exceed the same threshold in the subsequent year--2.5 to 24 times the proportion in the non-poor, non-elderly population as a whole.

Trends in Expenditures for High-Cost Illness

Two approaches were used in this report to describe changes in the extent of high-cost illness over time. The first assessed changes in the proportion of total medical expenses attributable

SUMMARY TABLE 3. AVERAGE EXPENSES IN 1982 DOLLARS OF ALL FAMILIES AND OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, IN CATASTROPHIC AND SUBSEQUENT YEARS (Percent above average expense of all families in parentheses)

Group	Average Expense, Catastrophic Year	Average Expense, First Subsequent Year	Average Expense, Second Subsequent Year
All Families	1,182[a]	1,199[a]	1,227[a]
Families Exceeding $3,000 in Catastrophic Year	7,015 (493)	2,768 (131)	2,619 (113)
Families Exceeding $5,000 in Catastrophic Year	10,315 (773)	3,542 (195)	3,244 (164)
Families Exceeding $10,000 in Catastrophic Year	18,727 (1,484)	5,365 (347)	4,446 (262)
Families Exceeding $20,000 in Catastrophic Year	34,641 (2,831)	8,504 (609)	5,347 (336)

a. These values differ slightly from the average presented in Summary Table 1 for technical reasons; the difference has no practical importance. The results reflect a sample of insurance contracts active for at least three years, while to be included in the results in Summary Table 1, families only had to be active for one year.

to the families with the highest expenses. Families were ranked in terms of their annual expenses, and the proportion of total expenses attributable, for example, to the top 20 percent of all families was compared from year to year. The second approach assessed changes in the incidence of high-cost illness--that is,

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changes in the proportion of families exceeding the catastrophic thresholds.[4]

Expenses Attributable to High-Cost Families. In the non-elderly, non-poor population, the proportion of total expenses attributable to high-cost families was quite stable, growing only slightly from 1974 to 1978 (see Summary Table 4). For example, the 1 percent of families with the highest expenses accounted for 20 percent of total expenses in 1974 and 22 percent in 1978. This

SUMMARY TABLE 4. PERCENT OF TOTAL MEDICAL EXPENSES ATTRIBUTABLE TO FAMILIES WITH THE HIGHEST EXPENSES, 1974 AND 1978

Families, Ranked by Expenses	1974	1978
Top 25 Percent	91	91
Top 20 Percent	85	86
Top 10 Percent	65	67
Top 5 Percent	47	49
Top 1 Percent	20	22

4. In both cases, the trends analyzed were purged of any effects of demographic change. It is unlikely that demographic change will produce sizable changes in patterns of high-cost illness in the non-elderly population over the next decade. In the population as a whole, however, demographic change--specifically, the growing proportion of the population over age 65 and the increasing average age of the elderly--can be expected to produce sizable increases in the frequency of high-cost illness.

contradicts a widely held assumption that expenditures for high-cost illness have been growing substantially faster than expenditures for other medical care in the population studied.

Incidence of High-Cost Illness. Over the five-year period covered by the study, the incidence of high-cost illness grew rapidly in the population studied. This growth, however, was almost entirely the result of the rapid increase of medical expenditures in general. Expenditures for high-cost illness grew only slightly faster than did expenditures for other medical care.

Because medical expenditures, incomes, and prices are rising simultaneously, the criterion of what constitutes high-cost illness can change over time. The incidence will vary according to whether the catastrophic thresholds are left constant in nominal dollars or are increased periodically to keep pace with median family income, average family medical expenses, or some other index.

When the thresholds were left fixed in nominal dollars, the incidence of high-cost illness rose dramatically. When the thresholds were indexed to keep pace with rising average family medical expenditures, however, this increase in incidence was largely eliminated (see the Summary Figure). This indicates that most of the growth in high-cost illness in the non-elderly, non-poor population has been the result of the general increase in medical expenditures.

If the thresholds had been indexed to keep pace with rising family incomes--a strategy that could be incorporated into catastrophic health insurance plans to keep the maximum burden on affected families constant relative to their incomes--the growth in the incidence of high-cost illness from 1974 to 1978 would have been markedly reduced but would nonetheless have remained steep. For example, the proportion of families exceeding a $10,000 threshold indexed in this way would have increased by more than 80 percent during this period (see the Summary Figure).[5] This reflects the fact that between 1974 and 1978, median family income grew much less rapidly than did average medical expenses.

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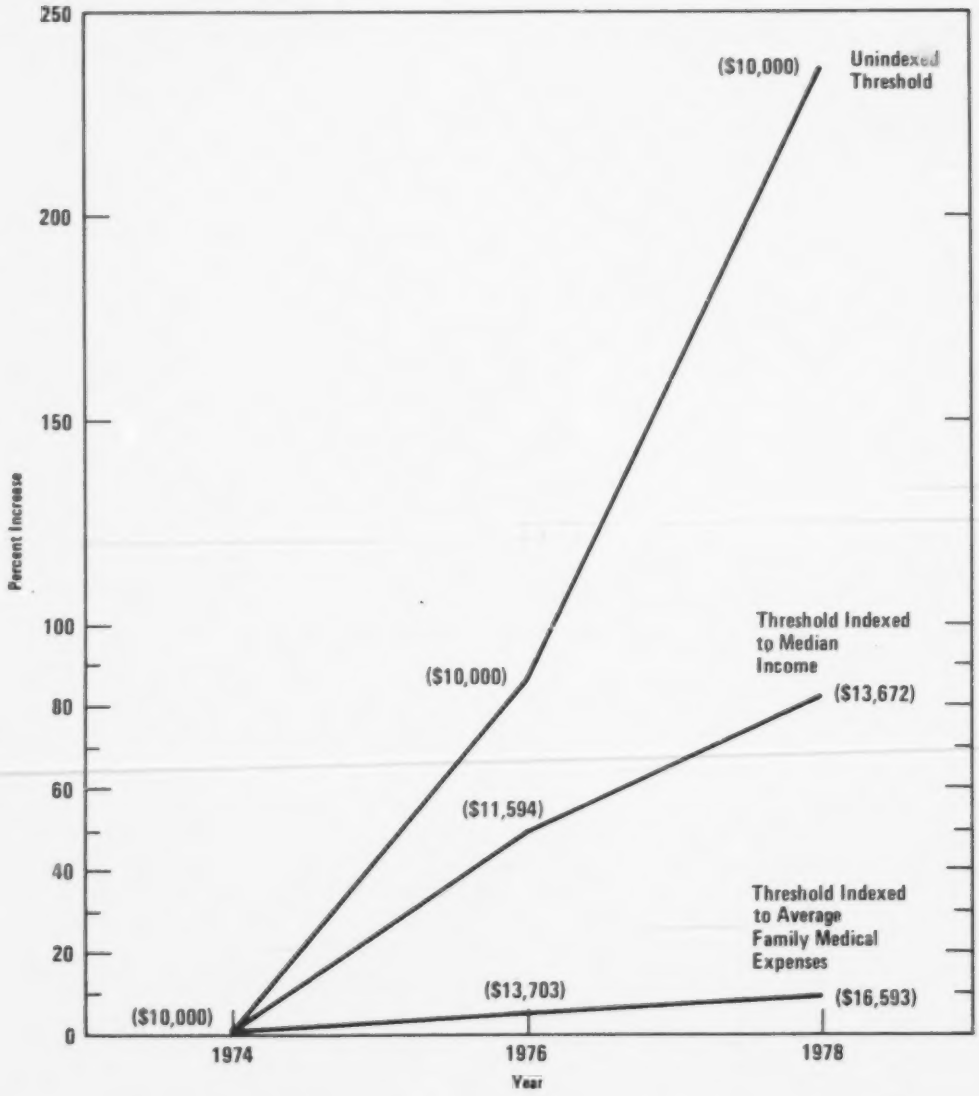
5. The threshold would be $10,000 only in the first year, as it would be increased each year thereafter to keep pace with rising incomes.

Summary Figure.

Illustrative Percent Increases in the Incidence of High-Cost Illness, Using Unindexed and Indexed $10,000 Thresholds



NOTE: Initial threshold values are $10,000, in 1974 dollars. All threshold values (in parentheses) are expressed in current (nominal) dollars.

The Contribution of High-Cost Illness to the Overall Increase in Medical Expenditures

Since disproportionate growth of high-cost illness has been relatively minor, it contributed very little to the overall growth in total medical expenditures in the population studied between 1974 and 1978. During that period, average medical expenses rose 66 percent. Had there been no disproportionate growth of high-cost illness, average expenses would have grown 61 percent.

That the disproportionate growth in high-cost illness contributed little to the overall increase in medical expenses, however, does not indicate that high-cost illness played little role in that increase. Rather, it indicates that high-cost illness contributed to the growth in expenditures roughly in proportion to its contribution to current expenditures. For example, since expenses above $3,000 currently comprise about 40 percent of total expenditures (see Summary Table 1), they contribute about the same proportion of the growth in expenditures.

POLICY IMPLICATIONS

These findings have implications for several areas of policy, including the allocation of medical resources, catastrophic health insurance, and the control of medical-care expenditures.

The Allocation of Medical Resources

This paper found that over a period of several years, medical resources are far less concentrated on a few high-cost families than a single year's data would suggest. These findings help clarify the subsidies inherent in any public or private health insurance that includes coverage of catastrophic illness. A one-year view of expenses suggests that a relatively few high-cost families receive large subsidies from the much more numerous families with lower expenses. To a considerable degree, however, these subsidies eventually cancel each other out. That is, many of the families subsidizing high-cost families in one year will in turn be subsidized at a later date.

This paper also found--in contradiction to a widely-held assumption--that the concentration of medical resources on high-cost families is growing only slowly in the non-elderly, non-poor population. Nonetheless, if the trends found in this study continued, a marked increase in the proportion of resources devoted to high-cost care would result over the long term. For example, if these

trends continued, the proportion of medical expenses attributable to the 1 percent of families with the highest expenses would grow from 22 percent in 1978 to perhaps 35 percent by the end of the century.

Catastrophic Health Insurance

This study clarifies the need for insurance protection against the expenses of high-cost illness, in that it provides estimates of both the frequency of such illnesses and the magnitude of expenses involved. In the absence of such insurance, high-cost illnesses impose large and often unmanageable costs on affected families or--through the bad debt mechanism--on other individuals or institutions.

The growth of high-cost illness over time, however, indicates that either the costs of any private or public catastrophic insurance plan would grow rapidly, or the amount of protection provided by the plan--relative to families' incomes--would fall sharply. This dilemma would arise regardless of the initial cost of the plan, which could be controlled to some degree by tailoring the plan's provisions. Moreover, any likely indexing of the plan's provisions would only lessen the problem. For example, if the plan's provisions were indexed to keep pace with rising incomes, steep cost increases would continue as long as medical expenditures rose faster than families' incomes.

Cost Containment

The patterns of high-cost illness found in this study indicate the limitations of several possible cost-containment strategies.

One strategy that would have relatively little effect on the increase in total medical expenditures in the non-elderly, non-poor population would be to focus cost-containment efforts primarily on high-cost illness. Many have suggested that rapid growth in expenditures for high-cost care--particularly, "heroic" care of the terminally ill--has been a major cause of the current increase in medical expenditures. This study shows, however, that disproportionate growth of high-cost illness has contributed relatively little to the overall growth of medical expenditures in the

population studied. Accordingly, bringing the growth of expenditures for high-cost illness down to--or even somewhat below--the rate of growth of other medical expenditures would have little impact on the overall increase in medical expenditures.

This study also suggests that while requiring increased cost sharing by consumers could have a sizable effect on costs in the short term, its use over the long term would be more problematic. Most current proposals to contain costs through this approach attempt to strike a balance between incentives to curb the rising use of services and the burden imposed on affected families. If medical expenditures continue to rise substantially more rapidly than incomes, however, it would be impossible to maintain over the long term whatever balance was established initially. Either the burden on affected families would increase, or the proportion of expenses subject to cost sharing--and, accordingly, the plan's impact on expenditure growth--would decline. As in the case of a catastrophic insurance plan, any likely indexing provisions would provide only a partial solution. Accordingly, if the burden imposed by cost sharing was maintained at a constant level over the long term, supplementary cost-containment measures would be required to compensate for cost sharing's declining impact on expenditures.

Finally, the unusually large subsequent-year expenses of high-cost families would pose difficulties for cost-containment strategies relying on consumer choice among competing insurance plans. To the extent that high-cost families can anticipate this subsequent elevation of expenses, they could contribute substantially to "adverse selection"--that is, the tendency for families to choose a level of insurance commensurate with their future expenses. By raising the cost of plans with more thorough coverage relative to the value of their benefits, this adverse selection would damage the ability of such plans to compete with others.

CHAPTER I. INTRODUCTION

Unusually expensive illnesses--often called "catastrophic illnesses"--have been a focus of concern at both the federal and state levels of government, as well as in the private sector, for many years. Such illnesses produce large costs for governments, for individuals, and for those employers who pay health insurance premiums. Moreover, they can present a family with an unmanageable financial burden or require that it forgo needed medical care.

The problem of high-cost illnesses should be distinguished from the problem of rapidly rising average or total health-care costs. The two are related insofar as high-cost illness contributes to the overall rise in average or total medical expenses, and, conversely, rising total medical expenses contribute to an increase in expenditures for high-cost illness. But growth in expenditures for high-cost illness depends on more than this. It is also affected by changes in the distribution of medical expenses--that is, changes in the proportions of medical resources devoted to different types of care. For example, in a setting in which resources are increasingly allocated to high-cost, high-technology care for the seriously ill, expenditures for high-cost illness may grow more rapidly than average costs. On the other hand, expenditures for high-cost illness may grow more slowly than average costs if resources are increasingly devoted to prevention, outpatient care, and other relatively low-cost services.

Information on catastrophic illnesses, and on the costs they impose, has important implications for health policy. For example, the patterns exhibited by such illnesses--such as their frequency in different sorts of families, their duration, the likelihood of recurrence in a single family, changes in their frequency over time, and so on--are critical information in deciding whether, and how, to provide insurance against the resulting costs. In addition, these patterns may have a substantial bearing on the effects of various strategies to control the rise in medical-care costs, such as proposals to increase consumer choice among health insurance plans or to increase cost-sharing requirements.

This paper addresses a variety of specific questions about the patterns shown by catastrophic illnesses in the non-elderly, non-poor population and about the costs these illnesses generate, including:

- What proportion of aggregate health-care expenditures are currently attributable to high-cost illnesses?
- How rapidly have expenditures for high-cost illness been growing, and to what extent has this growth contributed to the rapid increase in total medical expenses?
- What proportion of non-poor, non-elderly families are affected by high-cost illnesses, either within a single year or over a period of several years?
- What are the previous and subsequent medical expenses of high-cost families?

PLAN OF THE PAPER

The remainder of this chapter describes the scope of the paper and the data upon which it is based. Chapter II presents a one-year snapshot of family medical expenses, focusing on the proportion of families exceeding various levels of medical expense within a single calendar year. Chapter III expands the focus to the pattern of families' expenses over periods of two or more years. It addresses questions such as the extent to which high medical expenses reflect chronic rather than acute conditions. Chapter IV presents a brief analysis of trends in family expenses over the five years from 1974 through 1978 and assesses whether high-cost illness is growing relative to other medical spending or median family income. The final chapter examines the implications of these analyses for federal policy.

Throughout the paper, four "catastrophic thresholds"--$3,000, $5,000, $10,000, and $20,000--are used to delineate high-cost, or catastrophic, illness. That is, all families whose annual expenses exceeded the threshold in question are classified as high-cost families. Unless otherwise noted, both expenditures and thresholds are expressed in 1982 dollars.[1]

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1. In certain analyses of historical trends, which are noted in the text, threshold values are nominally the same but are not expressed in 1982 dollars. Rather, they are either expressed in current dollars or indexed to keep pace with changing median family income.

The specific dollar amounts of these thresholds are arbitrary, but their general levels have been chosen for several reasons. The wide range of the thresholds allows one to explore whether moderately high-cost and very high-cost illnesses show different patterns--for example, different growth rates--over time. This is useful in part because of the lack of consensus about how large a medical expense constitutes a catastrophe. Moreover, because of variations in existing insurance plans, many catastrophic health insurance proposals would in effect impose a variety of thresholds, in the general range of those used here, on different families, even if the proposals specify only one nominal threshold in terms of out-of-pocket expenses. For example, a sizable number of proposals introduced in the 96th and 97th Congresses would have required that some or all employment-related health insurance plans limit families' out-of-pocket expenses for covered medical services to a specified annual maximum ($2,500 in the Carter Administration's national health insurance proposal [H.R. 5400, 96th Congress]; $3,500 in the Martin-Jones proposal in the 97th Congress [H.R. 7000]; and $5,000 in Senator Dole's proposal in the 96th Congress [S. 748]). At the low end of the range, families with no insurance other than the legally mandated minimum would pay 100 percent of all covered expenses up to the limit under such plans, and nothing thereafter. The effective thresholds such families would experience under proposals of this sort are illustrated by the $3,000 and $5,000 thresholds used here. At the other end of the range, however, most families have existing insurance plans under which they would incur far larger expenses before reaching such a statutory limit. For example, a family whose existing insurance plan required that it pay 25 percent of all covered expenses out-of-pocket would need to incur $10,000 in total covered expenses before reaching a $2,500 limit on out-of-pocket expenses. The $10,000 and $20,000 thresholds used here illustrate the effective thresholds many such families would face under proposals of this sort.

Several appendixes provide additional background. Appendix A describes the samples and some of the methods used in the paper. Appendixes B and C analyze the extent of "attrition" and "accretion"--that is, families leaving or joining the data base over time. (They show that biases stemming from attrition and accretion, while measurable, are small and should not appreciably affect the conclusions presented in the paper.) Appendix D summarizes an earlier CBO working paper on the extent of protection against the costs of catastrophic illness in current employment-related insurance plans.

Three final appendixes provide supplementary analyses. Appendix E, which elaborates the one-year cross-section in Chapter II, analyzes the effects of age and sex on medical expenses. Appendix F, which also supplements Chapter II, examines the impact of using individuals' rather than families' expenses in reimbursing catastrophic medical expenses. Appendix G adds to the analysis of the long-term expenses of high-cost families (in Chapter III), by examining the impact of several insurance provisions aimed at illnesses that are not confined to a single calendar year.

SCOPE OF THE PAPER

The characterization of high-cost illness in this paper hinges on which population groups and which medical expenses are included in the analysis. The population groups and set of services considered here were chosen to be directly relevant to a variety of federal policy issues. Including other population groups or another set of expenses might, however, yield different patterns of expense.

The groups considered in this paper--the non-elderly, non-poor population, as defined below--comprised 52.6 million families, or roughly 60 percent of all families in the United States in 1980.[2] Since only a specific subset of medical expenses were considered, however, the report reflects a smaller proportion of total medical expenses. The 52.6 million families considered here incurred about $59.4 billion in annual expenses for the services included in this report (see below), in 1982 dollars. This corresponds to roughly 21 percent of total personal health-care expenditures in the nation.[3]

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2. Unrelated individuals are included as single-person families in these numbers.

3. Total personal health care expenditures in 1980, net of prepayment, administration, and public health activities, were $220 billion in 1980. In 1980 dollars, the annual expenses considered here totalled roughly $47 billion.

Which Population Groups Are Considered?

This paper considers only families with a non-elderly head employed full time and earning at least $7,200 in 1978 dollars.[4] This corresponded in 1978 to full-time employment at a wage approximately 35 percent above the minimum wage.[5]

There are two primary reasons for excluding low-income families and the elderly from this analysis. First, the data used in this report included no low-income families and only a nonrepresentative sample of the elderly (who were excluded from the analyses). In general, available data on health-care expenditures suitable for analyzing high-cost illness are usually limited to the poor, to the elderly, or to the non-poor, non-elderly. Although some surveys include all three groups, most are too small to permit reliable analysis of low-frequency, high-cost illness. The lack of appropriate data encompassing all three groups is largely a result of the fact that the expenses of the three groups are generally financed through different channels.

Second, on the federal level, the issues of health policy affecting the poor and the elderly are quite different from those affecting the rest of the population. For those groups, the major federal issues concern Medicaid, Medicare, and a variety of much smaller programs that deliver services directly. In contrast, the non-poor, non-elderly population is affected primarily by tax provisions and by various statutes and proposals pertaining to employment-related health insurance (such as catastrophic health insurance and consumer choice proposals).

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4. Because these criteria apply to families, rather than individuals, they exclude some, but not all, unemployed and part-time employed individuals. Such individuals would be excluded if living alone, for example. On the other hand, they would be included if they were spouses or minor dependents of individuals working full time and earning more than the income criterion.

   Since insurance claims data do not include identification of the family head, the health insurance contract holder was considered the family head in this study.

5. In terms of the minimum wage in effect in 1982, this corresponds to a current annual wage of roughly $9,100.

What Medical Expenses Are Considered?

The set of services considered in this paper is conventional in that it reflects both the coverage afforded by current mainstream private insurance and the services that would have been covered under many federal health benefit proposals. They include:

- o inpatient acute-care hospital charges;
- o surgical expenses;
- o most outpatient charges and out-of-hospital care by physicians;
- o prescription drugs;
- o physical therapy; and
- o limited out-of-hospital private nursing and home health care.

Among the expenses excluded from the analysis are:

- o most care in long-term care facilities;
- o most dental care; and
- o most vision care.

(Outpatient mental health services and some inpatient mental health services provided in acute-care hospitals were available in the data but were excluded from all analyses except Appendix C.)

What Are the Implications of Excluding Some Population Groups and Medical Services?

The exclusion of certain population groups and medical services from the analyses in this report imposes important limits on the generalizations that can be drawn from them.

Several of the central findings of this paper would likely be somewhat different if the elderly population was included. The proportion of families exceeding the catastrophic thresholds would probably be markedly higher. In addition, the historical trends in catastrophic illness (Chapter IV) would likely be appreciably different. The proportion of the population over age 65 is growing rapidly, as is the average age of the elderly population.

Since the incidence of high-cost illness increases with age (see Appendix E), these factors would produce additional growth of high-cost illness in the population as a whole, above that shown in Chapter IV.

Some of the findings might also have differed if low-income families--and families lacking a full-time employed head--were included. Low-income families and the unemployed are substantially more likely than others in the population to have no health insurance coverage, either private or public. Their use of health-care services would accordingly differ in many cases.

Although the exclusion of certain services--such as most long-term care expenses--from this analysis reflects both common insurance practices and many proposals that have been considered by the Congress, it can have pronounced effects on the patterns of expenses described in subsequent chapters. Families that use large amounts of some of the excluded services are often subject to medical conditions substantially different from those affecting the high-cost families included in the following chapters. For example, the expenses of the chronically and severely mentally ill are largely unrepresented in the data reported below, as are the expenses of individuals with many other chronic, severe handicaps. It is likely that inclusion of these specific expenses would substantially increase the proportion of high-cost families that exceed a catastrophic threshold two or more years in succession. Thus, the patterns of expenses described in subsequent chapters must be interpreted with the caveat that they reflect only a specific set of medical expenses.[6]

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6. The policy issues pertaining to the excluded services are also quite different. Many of the high-cost families whose expenses are excluded differ from those included in terms of both the availability of relevant private or public insurance coverage for their expenses and the network of practitioners and providers from whom they obtain services. For example, the chronically and severely mentally ill are less likely than most others to have stable employment, which lessens the probability of their having private health insurance. (Private insurance often offers little coverage of the relevant services in any case.) Medicare offers only limited reimbursement for the sorts of services such people require, although Medicaid offers more for those who are eligible. Moreover, much of their care is likely to be obtained from state mental hospitals or community mental health centers, rather than from

(Continued)

THE ADVANTAGES AND LIMITATIONS OF THE DATA

The data on which this report is based were derived from the claims records of the high-option Blue Cross-Blue Shield Federal Employees' Health Benefit Plan (BCFEHBP). The BCFEHBP data have several advantages for analyses of high-cost illness, but they also have limitations that should be taken into account in interpreting the findings in this paper.

The BCFEHBP data base is far larger than most of the alternative data bases pertaining to the non-elderly, non-poor population. This is an important advantage in assessing high-cost illness, because the low frequency of such illnesses makes estimates based on smaller data bases unreliable. In addition, the BCFEHBP data allow one to track individual families for a period of years, which is essential in order to assess the previous and subsequent experience of high-cost families. Since the BCFEHBP plan is quite comprehensive, the data offer a relatively complete record of families' medical expenses. The BCFEHBP data, and insurance data in general, also probably provide a substantially more accurate tabulation of the expenses of high-cost families than could be obtained from most survey data.[7]

On the other hand, the BCFEHBP data are not entirely representative of the non-elderly, non-poor population. For example, federal workers may be more highly educated than the work force in general, given the high proportion of white-collar jobs in the federal government. Similarly, they probably have a different distribution of income. Moreover, federal workers choosing the Blue Cross High Option Plan may differ from those electing other federal insurance plans. On the other hand, the data were

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6. (Continued)
the acute-care hospitals and private physicians' practices that are well represented in the data used here. Accordingly, any private or public initiative responding to the needs of such families is likely to differ markedly from initiatives aimed at the high-cost families discussed in this paper.

7. On the other hand, insurance data from plans with deductibles (including BCFEHBP) probably provide a less accurate measure of the expenses of families with very low expenses. This weakness, however, is less important for the analyses in this report.

weighted to be representative in terms of age, sex, family size, and region--factors that have clear relationships with medical expenses.

In all, the BCFEHBP data should provide a reasonably good appraisal of the large medical expenses of the non-elderly, non-poor population. The limitations mentioned may, however, create some distortion in comparison with the patterns that would appear in a sample designed specifically to be representative.

It is also important to note that the data used in this report reflect the insurance claims of a group with quite comprehensive insurance. To the extent that the use of health care varies with its price, the patterns of expenses shown by less thoroughly insured groups could be different. As noted in Appendix D, however, the average employment-related insurance plan provides quite thorough coverage of large expenses, and most of the non-poor, non-elderly population is covered by such plans.[8] Accordingly, since the focus of this report is on high-cost illness, the comprehensiveness of the Blue Cross plan should not create major biases.

For further discussion of the data, see Appendix A.

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8. See Congressional Budget Office, Profile of Health-Care Coverage: The Haves and Have-Nots (March 1979).

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CHAPTER II. FAMILY MEDICAL EXPENSES IN A SINGLE YEAR

In any given year, a sizable number of families have medical expenses many times as great as those of the average family. The frequency and characteristics of these high-cost cases have important implications for health-care policy.

Importance for Policy

The importance of high-cost illness for policy stems in large part from the substantial portion of total medical expenses attributable to it. Because their medical expenses are atypically large, high-cost families contribute disproportionately to the total. Accordingly, high-cost illness is a major factor to consider in assessing both the problem of high national expenditures for medical care and the equity and efficiency with which health-care resources are allocated. For example, some would argue for directing additional resources into high-cost care for the seriously ill, while others would prefer to see a larger proportion of health-care resources devoted to lower-cost routine and preventive services. In either case, the costs currently associated with high-cost illness and the proportion of families affected by it are critical information.

The issue of high-cost illness arises frequently in the context of private or public efforts to insure individuals and families against the resulting financial burden. Among private employment-related insurance plans, reimbursement for large annual covered expenses is typically quite thorough and has been becoming more so over time.[1] Catastrophic health insurance plans have been enacted by a number of state governments, and a variety of proposals introduced in the Congress would either establish a federal catastrophic health insurance program or mandate that certain employers provide such insurance.

1. See Appendix D and Congressional Budget Office, Protection from Catastrophic Medical Expenses.

Major Findings

The major findings of this chapter are the following:

- In the non-elderly, non-poor population, families exceeding the four catastrophic thresholds analyzed ($3,000, $5,000, $10,000, and $20,000) in any one year are relatively rare, but they account for a sizable proportion of total medical expenses. For example, about 5 percent of all families exceed $5,000 in expenses, but they account for about half of total expenses. (As explained in Chapter III, however, the proportion of families who exceed a catastrophic threshold at least once during a several-year period is far larger.)

- The expenses of these high-cost families tend to be concentrated in one family member, and this concentration becomes more pronounced when higher thresholds are used. In nearly three-fourths of families with expenses over $20,000, 95 percent or more of family medical expenses are attributable to one family member.

- The proportion of expenses attributable to inpatient charges is in general large among high-cost families and increases when higher thresholds are used.

Plan of the Chapter

This chapter begins with a detailed look at the national distribution of medical expenses. A subsequent section explores the role of individual family members in high-cost illness. Appendix E supplies supplementary information on the relationships between medical expenses and the age and sex of the contract holder. Appendix F presents a supplementary analysis of the impact of basing a catastrophic health insurance plan on the expenses of individuals, rather than families.

THE NATIONAL DISTRIBUTION OF EXPENSES

The general shape of the distribution of medical expenses is that most families cluster at low levels of expense, with a long, thin "tail" of families stretching out to very high levels of expense. This is referred to as a "skewed" distribution: the low-expense end of the distribution is short and compact, while the

high-expense end is long and thin. Figure 1 shows the skewed distribution of expenses graphically.[2]

Another way to show the extreme "skewness" of medical expenses is to look at the percent of families exceeding certain annual levels of expense in any one year (see Table 1). Only 5 percent of all families exceed $5,000; 2 percent exceed $10,000, and 0.5 percent exceed $20,000.

The relatively few families with high expenses in a single year necessarily contribute disproportionately to total medical expenses (see Table 1). This disproportion is more marked when higher thresholds are used, but even in the case of the lowest thresholds, it is striking. The 11 percent of families with expenses over $3,000 contribute fully two-thirds of all expenses, while the 5 percent with expenses over $5,000 account for half of all expenses. Families exceeding $20,000 in a single year comprise only about half a percent of all families, but they account for 14 percent of all expenses.

Another way of assessing the importance of high-cost illness is to consider only expenses in excess of a given threshold. That is, rather than considering all expenses of high-cost families--which include their expenses both above and below the threshold--one can tabulate only their expenses after they reach the threshold. Viewed this way, the disproportionate role of high-cost illness is necessarily smaller but is nonetheless still striking (see Table 1). For example, although 2 percent of all families exceed $10,000 per year, expenses in excess of $10,000 per year account for 13 percent of total medical expenditures. Similarly,

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2. The distribution of medical expenses discussed in this chapter and displayed, for example, in Figure 1 and Table 1, are based on 1978 experience, projected forward such that the average expense is equal to the projected average expense in 1982. This method may slightly underestimate the proportion of families at very high levels of expense, because that proportion rose between 1974 and 1978 and might have continued growing between 1978 and 1982. The extent of the underestimation, however, is likely to be very small, and it would primarily affect only families with expenses above $20,000 per year. For example, the proportion of families exceeding $20,000 in Table 1 is 0.5 percent. If underestimation is present, the correct figure most likely would be about six-tenths of one percent. Such a bias would not materially affect conclusions presented here.

Figure 1.

Distribution of Family Medical Expenses: Percent of Families with Annual Expenses in Given Intervals

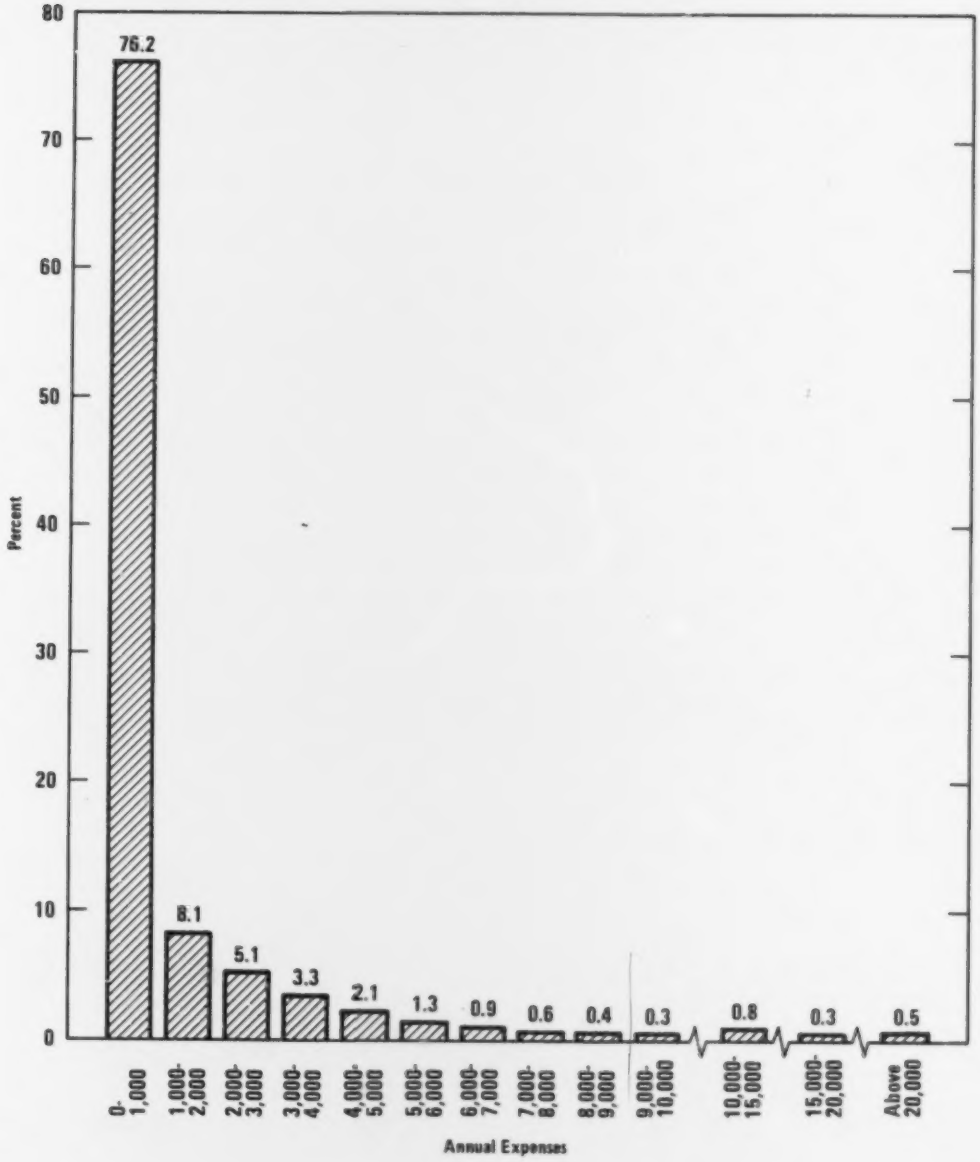

TABLE 1. PERCENT OF FAMILIES EXCEEDING VARIOUS LEVELS OF ANNUAL EXPENSE, PERCENT OF TOTAL MEDICAL EXPENDITURES ATTRIBUTABLE TO THEM, AND PERCENT OF EXPENSES ABOVE THE LEVELS

Level of Expense	Percent of Families Exceeding Level	Expenses of Families Exceeding Levels, as Percent of Expenses of All Families	
		Total Expenses of Families Exceeding Level	Only Expenses Above Level[a]
1,130[b]	23	[c]	[c]
3,000	11	68	40
5,000	5	50	26
10,000	2	28	13
20,000	0.5	14	5
30,000	0.2	[c]	[c]

a. Includes all families exceeding the levels, but excludes the portion of their expenses that falls below the level.

b. Average annual expense.

c. Not estimated.

even though families exceeding $20,000 comprise only 0.5 percent of all families, expenses in excess of $20,000 contribute 5 percent of all expenditures.

Inpatient expenses comprise a larger share of annual expenses in high-cost families than in the average family. Averaged across all families, about 75 percent of claims expenses were accounted for by inpatient charges. Among families exceeding a $3,000 threshold, this proportion was about 89 percent. Among families exceeding $20,000, inpatient charges accounted for 93 percent of total expenses. These proportions remained largely unchanged over the five years covered by the study.

THE ROLE OF INDIVIDUAL FAMILY MEMBERS IN HIGH-COST ILLNESS

To what extent are large family medical expenses attributable to a single family member? This question has important implications for plans to insure families against the expense of catastrophic illness, because eligibility for reimbursement could be based on either individuals' or families' expenses. This section examines the proportion of annual expenses attributable to a single family member and the number of high-cost individuals in high-cost families. Appendix F relates these questions directly to policy issues by examining the effects of using individuals' expenses rather than families' expenses in determining eligibility for reimbursement under a catastrophic health insurance plan.

The major findings of these analyses are the following:

- The bulk of the expenses incurred by high-cost families are attributable to one family member, and this pattern becomes more pronounced when higher thresholds are used.

- Most high-cost families include one, and only one, individual whose expenses taken alone exceed the threshold. This pattern is also more pronounced when higher thresholds are used.

The Proportion of Expenses Attributable to a Single Family Member

Family medical expenses are typically concentrated in an individual family member, and this concentration is more pronounced among families with high annual expenses. For example, in about three-fourths of all families filing claims,[3] one individual accounts for at least 75 percent of claimed expenses, and in more than half of all families filing claims, one individual accounts for 95 percent or more of the family's total (see Table 2). Among families exceeding $20,000 in expenses, the degree of concentration is substantially greater. In 92 percent of such families, one individual accounts for at least 75 percent of expenses, and

3. This excludes both families with no covered expenses and families that chose not to file claims because their expenses were small. The excluded families comprise about 34 percent of the sample.

TABLE 2. PERCENT OF FAMILIES IN WHICH ONE INDIVIDUAL ACCOUNTS FOR MORE THAN SPECIFIED PERCENTAGES OF TOTAL FAMILY EXPENSES, BY LEVEL OF EXPENSE

Percent of Expenses Attributable to One Family Member	All Families Filing Claims[a]	Families With Annual Expenses Exceeding			
		$3,000	$5,000	$10,000	$20,000
75 or more	75	77	77	82	92
80 or more	71	73	73	79	89
85 or more	67	68	68	74	85
90 or more	62	61	62	69	78
95 or more	56	51	53	62	71

a. Excludes the approximately 34 percent of families that had no expenses or chose not to file claims because their expenses were small.

in nearly three-fourths of such families, one individual accounts for at least 95 percent of expenses.[4]

The Number of High-Cost Individuals in High-Cost Families

Another way of looking at the role of individuals in high-cost illness is to calculate the number of high-cost individuals (that is, individuals exceeding catastrophic thresholds) within high-cost families. This can be done by separating the families that exceed a given threshold into categories: those in which no single family member alone exceeds the threshold, those in which

4. These percentages include single-person families, in which all expenses are necessarily attributable to one person. Deleting all single-person families, however, has little effect on the percentages in Table 4, particularly when high thresholds are used.

only one family member exceeds the threshold, and those in which two or more family members exceed the threshold.

A sizable portion of high-cost families (from 15 to 21 percent, depending on the threshold), have no single family member whose expenses taken alone exceed the relevant threshold (see Table 3). These are the families that would be classified as high-cost cases under a family threshold, but not if the same dollar threshold was applied to the expenses of individuals.

TABLE 3. PERCENT OF HIGH-EXPENSE FAMILIES WITH ZERO, ONE, OR TWO OR MORE INDIVIDUALS EXCEEDING INDIVIDUAL THRESHOLDS, BY THRESHOLD

Percent of Families Exceeding Threshold With:	Threshold			
	$3,000	$5,000	$10,000	$20,000
No Single Family Member Exceeding Threshold	17	21	18	15
One Family Member Exceeding Threshold	79	77	81	85
Two or More Family Members Exceeding Threshold	4	2	1	a/

a. No reliable estimate available. This occurred in only one instance in the 1978 sample used here, corresponding (when weighted) to less than 0.02 percent of the families exceeding $20,000 in that year.

The majority of high-cost families include only one family member whose expenses taken alone exceed the threshold. When the lower two thresholds are used, about three-fourths of high-cost families include only one high-cost individual. This proportion increases if higher thresholds are used, and with a $20,000 threshold, about 85 percent of high-cost families include only one high-cost individual.

Few high-cost families include two or more individuals who alone exceed the threshold, particularly when high thresholds are used. Using a $3,000 threshold, about 4 percent of all high-cost families include two or more high-cost individuals (see Table 3). This drops to 1 percent with a $10,000 threshold and to nearly zero with a $20,000 threshold.[5] In some cases, it is simply coincidence that two individuals in the same family exceed a threshold in the same year, but in other instances their illnesses are clearly related.[6]

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5. Only one family of the 126,590 for whom 1978 data were used included two or more individuals who exceeded $20,000 in that year.

   It is possible that families with two or more high-cost individuals are somewhat underrepresented in these data. Extremely serious automobile accidents could lead to expenses over the threshold for each of several family members. Some portion of expenses stemming from such accidents would be reimbursed by automobile insurance policies rather than by Blue Cross. This should be a minor problem, however, because these data should include all related expenses if Blue Cross reimbursed even a small fraction of them. Only cases where the automobile policy paid the expenses in full should be omitted from these data.

6. Maternity is one context in which two high-cost illnesses can be clearly related. A seriously ill newborn can generate large expenses in a short time, because charges for neonatal intensive care are typically high. Likewise, if delivery is complicated, the mother's expenses can mount rapidly. For example, in one case in the data used here, a newborn placed in intensive care accrued expenses of $10,400 in the first 11 days of life. The mother, who delivered by cesarean section, accrued expenses of $5,000 for delivery and related expenses. (Prenatal care and delivery are often billed together as a single charge at the time of delivery, and in this instance they clearly were.) Apart from that 11-day period, however, the family's total claims for the year amounted to less than $100.

CHAPTER III. PATTERNS OF HIGH-COST ILLNESS OVER TWO OR MORE YEARS

A critical aspect of high-cost illness is its duration. Long-term or recurrent high-cost illness poses different problems than short-term high-cost illness, and the relative frequency of short- and long-term high-cost illnesses has important implications for policy.

Importance for Policy

The importance of long-term and recurrent illness stems in part from the fact that the financial consequences of high-cost illness are somewhat cumulative for most families. The longer the duration of a high-cost illness, the more likely the family is to deplete its resources (including not only savings and other assets, but also access to credit). Longer-term illnesses therefore have more serious implications, not only for the families involved, but also for others. Taxpayers, consumers, and health-care institutions are forced to assume costs--for example, bad debts--that cannot be managed by the affected families.

Legislation aimed at providing protection against the expense of catastrophic illness should therefore take account of the actual mix of short- and long-term illness. Since most catastrophic health insurance proposals have been built around an annual accounting period (in that expenses during one calendar year are the criterion for establishing a "catastrophic" level of expense), the critical questions are how often high-cost illness lasts more than one calendar year, and how long such cases typically last.[1]

The duration of high-cost illness is also an important factor to consider in assessing the extent to which medical resources are

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1. Depending on these patterns, legislation could address the problem of longer-term illness through a variety of provisions such as floating accounting periods (in which a family can use any consecutive 12 months, rather than just a calendar year, as a basis for claiming benefits), multiyear deductibles, or carryover provisions (which establish criteria for maintaining benefits temporarily after a catastrophic year). These provisions are analyzed in Appendix G.

concentrated on a relatively small number of high-cost families. If high-cost families generally do not remain above the catastrophic threshold for more than one year, then most of each year's group of high-cost families would be new. A large amount of turnover of this sort among high-cost families would indicate that, over the long term, medical resources are less concentrated on a relatively few families than is suggested by the one-year cross-section presented in the previous chapter.

Major Findings

In the non-elderly, non-poor population, families exceeding a catastrophic threshold have, on average, atypically large expenses the subsequent year, ranging up to 609 percent above the average expenses of all families (depending on the threshold used). Moreover, their average expenses remain high two years later, ranging up to 336 percent above the average expenses of all families. To the extent that data are available, the demographic characteristics of high-cost families--for example, the age of the family head and family size--contribute very little to this elevation of subsequent expenses.

One component of the subsequent high expenses of these high-cost families is that they are far more likely than the average family to exceed a catastrophic threshold in the subsequent two years. For example, only about 2 percent of all families exceed a $10,000 threshold in any one year. Of the families that do exceed this threshold, however, 18 percent will exceed the same threshold the following year, and 12 percent will exceed the same threshold two years later.

High-cost families tend to have atypically high expenditures in the previous year as well. In the aggregate, the pattern of their expenses during the year before their high-cost year is very similar to the pattern during the year after.

Despite the atypically high expenses of high-cost families in previous and subsequent years, however, the great majority of high-cost families do not exceed the threshold two years in a row. Therefore, most of each year's group of high-cost families are new. Accordingly, over the long term, medical resources are substantially less concentrated on a relatively few families than is the case in any one year. For example, fully one in four non-elderly, non-poor families have annual expenses above $3,000 at least once during a three-year period.

Plan of the Chapter

The remainder of this chapter is divided into three sections. The first considers the expenses of high-cost families in subsequent and previous years. The second section analyzes the extent of turnover among high-cost families, by assessing the probability of exceeding a catastrophic threshold at least once during a two- or three-year period. The third section provides some case histories illustrating some of the patterns that occur in illnesses lasting more than one year. Appendix G presents supplementary analyses of high-cost illnesses that do not fit neatly within calendar years. Its approach is to assess the effects of a variety of alternative provisions that could be incorporated into a catastrophic health insurance plan to handle such illnesses.

In both this chapter and Appendix G, each year's expenses were made comparable to all other years included in the analysis by inflating each year's expenses to a constant (1982) per-family average. This removed the effects of changing average medical expenditures from the results presented. This approach greatly simplifies presentation without distorting the basic comparisons that are drawn. Some of the specific numbers would have been different, however, if the effects of changing medical expenses had been included.[2]

EXPENSES OF HIGH-COST FAMILIES IN SUBSEQUENT AND PREVIOUS YEARS

This section examines two aspects of the expenses of high-cost families the year before and in the two years after the year

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2. For example, Table 5 below shows that of families that exceed a $5,000 threshold in any one year, 20 percent will exceed the same threshold the following year. This compares to the 5 percent of all families that exceed that level of expense. Had the effects of rising medical expenditures been included in the analysis, the same basic relationship--that is, the far greater than average incidence of high-cost illness in the subsequent year among families that exceeded the threshold in the baseline year--would have appeared. The incidence of high-cost illness in the subsequent year, however, would be higher (both among all families and among those exceeding the threshold in the baseline year) because of the rise in average medical expenses from one year to the next.

which their expenses exceed a catastrophic threshold. Their average expenses in those years are compared to the average expenses of all families. In addition, the proportion of high-cost families that again exceed a threshold during those years is analyzed.

Average Expenses in Subsequent Years

On average, the expenses of families that exceed a catastrophic threshold in any year decline greatly by the subsequent year but remain far higher than the average expenses of all families (see Table 4 and Figure 2). For example, families exceeding a threshold of $5,000 have average expenses of $10,300 in that year, nearly 800 percent above the average expenses of all families. In the subsequent year, their average expenses drop to about $3,500, 195 percent above the average of all families. Families exceeding $20,000 have average expenses of about $34,600 in that year, which is more than 2,800 percent above the average of all families. By the subsequent year, their average expenses drop to $8,500, which is 609 percent above the average of all families.

In the second subsequent year, the average expenses of high-cost families drop relatively little from their level in the first subsequent year (see Table 4 and Figure 2). For example, families exceeding $5,000 in the baseline year have expenses averaging about $3,500 (195 percent above the overall average) in the first subsequent year; this drops only to about $3,200 (164 percent above average) in the second subsequent year. As higher thresholds are used, the second-year drop in expenses becomes somewhat larger. For example, families exceeding $20,000 in the baseline year have expenses about 600 percent above average in the first subsequent year, but only about 340 percent above average in the second subsequent year.

The higher average subsequent expenses of high-cost families are by and large not attributable to the demographic factors about which data are available. As noted in Appendix E, the incidence of high-cost illness increases with age and is different among men and women. In addition, the incidence is markedly higher in multiperson families than in single-person families. These factors contribute little, however, to the subsequent elevation of expenses experienced by high-cost families.

TABLE 4. AVERAGE EXPENSES OF ALL FAMILIES AND OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, IN CATASTROPHIC AND SUBSEQUENT YEARS (Percent above average expense of all families in parentheses)

Group	Average Expense, Catastrophic Year	Average Expense, First Subsequent Year	Average Expense, Second Subsequent Year
All Families	1,182[a]	1,199[a]	1,227[a]
Families Exceeding $3,000 in Catastrophic Year	7,015 (493)	2,768 (131)	2,619 (113)
Families Exceeding $5,000 in Catastrophic Year	10,315 (773)	3,542 (195)	3,244 (164)
Families Exceeding $10,000 in Catastrophic Year	18,727 (1,484)	5,365 (347)	4,446 (262)
Families Exceeding $20,000 in Catastrophic Year	34,641 (2,831)	8,504 (609)	5,347 (336)

a. These values differ slightly from the average presented in Chapter II for technical reasons; the difference has no practical importance. These results reflect a sample of contracts active for at least three years, while to be included in the results in Chapter II, families only had to be active for one year.

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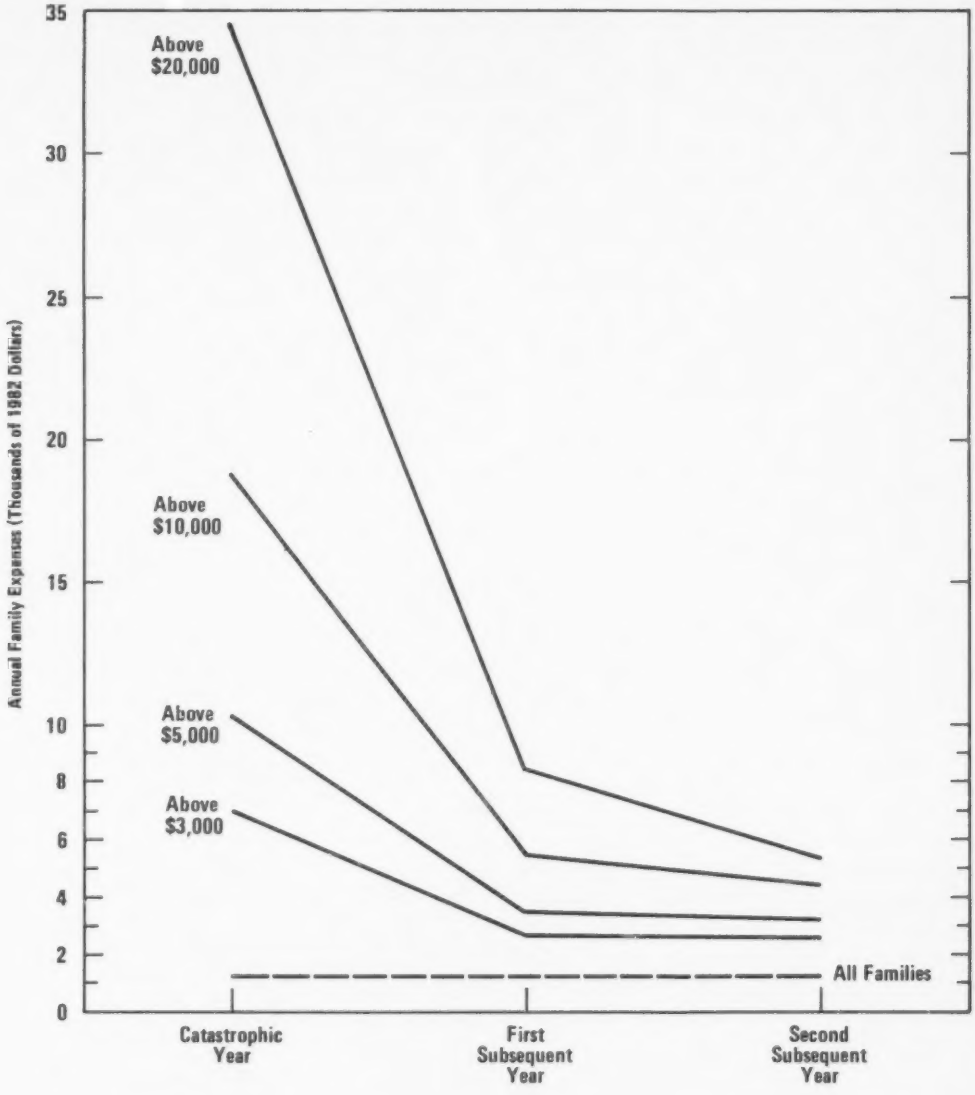
Figure 2.

Average Expenses of All Families and of Families Exceeding Catastrophic Thresholds in Catastrophic and Subsequent Years (In 1982 dollars)



Recurrence of High-Cost Illness in Subsequent Years

One aspect of this average elevation of subsequent-year expenses is that families exceeding a threshold in one year are far more likely than the average family to exceed any of the thresholds in the subsequent year (see Table 5). For example, while only 5 percent of all families exceed a threshold of $5,000 in any one year, that threshold is exceeded by 20 percent of those that exceeded $5,000 in the previous year, and over 30 percent of those that exceeded $20,000 in the previous year. Similarly, while only about 0.5 percent of all families exceed $20,000 in any one year, that threshold is exceeded by 6 percent of those families that exceeded $10,000 the previous year, and by 12 percent of those that exceeded $20,000.

The relatively high rate of recurrence of high medical expenses largely persists into the second subsequent year (see Table 6). For example, while only 2 percent of all families exceed a threshold of $10,000 in any one year, that threshold is exceeded by 12 percent of the families that exceeded the same threshold two years previously.

TABLE 5. PERCENT OF FAMILIES EXCEEDING THRESHOLDS IN FIRST SUBSEQUENT YEAR, BY LEVEL OF EXPENSE IN BASELINE YEAR

	Threshold			
	$3,000	$5,000	$10,000	$20,000
All Families[a]	11	5	2	0.5
Baseline Expenses Above $3,000	27	15	6	2
Baseline Expenses Above $5,000	31	20	9	3
Baseline Expenses Above $10,000	40	30	18	6
Baseline Expenses Above $20,000	40	32	21	12

a. These values differ slightly from those presented in Chapter II for technical reasons; the difference has no practical importance. These results reflect a sample of contracts active for at least two years. See footnote to Table 4.

TABLE 6. PERCENT OF FAMILIES EXCEEDING THRESHOLDS IN SECOND SUBSEQUENT YEAR, BY LEVEL OF EXPENSE IN BASELINE YEAR

	Threshold			
	$3,000	$5,000	$10,000	$20,000
All Families[a]	11	6	2	0.6
Baseline Expenses Above $3,000	24	14	5	2
Baseline Expenses Above $5,000	28	18	8	3
Baseline Expenses Above $10,000	36	24	12	4
Baseline Expenses Above $20,000	37	25	14	8

a. These values differ slightly from those presented in Chapter II and in Table 5 for technical reasons; the difference has no practical importance. These results reflect a sample of contracts active at least three years. See footnote to Table 4.

Expenses of High-Cost Families During the Previous Year

Families that exceed a catastrophic threshold in a given year have, on average, atypically large expenses the previous year as well. This reflects, in part, two different phenomena: chronic high-cost illness (that is, expenses exceeding a given threshold in the previous year as well as in the catastrophic year), and expenses that build up for some time before they finally exceed the threshold.

The average previous-year expenses of high-cost families are very similar to their subsequent-year expenses--that is, well below their catastrophic-year expenses but nonetheless substantially higher than the average expenses of all families (see Table 7). Indeed, when the lower thresholds are applied, the previous-year and subsequent-year expenses are virtually identical, and when

TABLE 7. AVERAGE EXPENSES OF ALL FAMILIES AND OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, IN CATASTROPHIC, PREVIOUS, AND SUBSEQUENT YEARS

Group	Average Expense, Catastrophic Year	Average Expense, Previous Year	Average Expense, First Subsequent Year
All Families	1,180	1,170	1,180
Families Exceeding $3,000 in Catastrophic Year	7,170	2,820	2,800
Families Exceeding $5,000 in Catastrophic Year	10,580	3,500	3,570
Families Exceeding $10,000 in Catastrophic Year	19,120	4,900	5,640
Families Exceeding $20,000 in Catastrophic Year	33,480	6,540	7,390

a. These values differ slightly from the average presented in Chapter II and from Table 4 for technical reasons; the difference has no practical importance. These results reflect two different samples of contracts active at least two years. See footnote to Table 4.

the higher thresholds are applied, the two differ by no more than 15 percent.[3]

3. Note that these tabulations exclude those who died during the period in questions. Given that families enter and leave the data base each year, this analysis could only be done meaningfully by limiting the tabulations to families for which data were available during all years in question.

One component of large average previous-year expenses of high-cost families is that such families are far more likely than the average family to exceed the threshold in the previous year. The previous-year incidence of high-cost illness is among high-cost families very nearly the same as the subsequent-year incidence shown in Table 5.

PROBABILITY OF HIGH-COST ILLNESS OVER SEVERAL YEARS

Although the proportion of families exceeding catastrophic thresholds within any one year is small, the proportion exceeding thresholds in at least one year during a several-year period is much larger. Thus, the resources devoted to high-cost illness are in fact allocated to far more families than a single year's data would suggest.

The proportion of families with expenses above $3,000 in any one year, for example, is only 11 percent, but 20 percent reach that level at least once in a two-year period, and fully one-fourth of all families exceed $3,000 at least once in a three-year period (see Table 8). If the analysis was extended to longer periods of time, a substantially larger proportion of families would be found to exceed $3,000 at least once. The effect of considering several years, rather than just one, is even more striking when higher thresholds are used to define high-cost illness (although this fact is partly obscured by rounding error in Table 8).

This pattern reflects the fact that the great majority of high-cost familes in any one year did not exceed the same threshold the previous year and will not do so the subsequent year. Although families exceeding a threshold are more likely than other families to exceed the same threshold the next year, only 12 to 27 percent do so (as was shown in Table 5). This indicates that roughly 75 to 90 percent of high-cost families in any one year are "new" cases, in that their expenses the previous year did not qualify them as high-cost.[4]

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4. To obtain precise estimates, one would need a table that displayed the previous-year incidence of high-cost illness, rather than the subsequent-year incidence shown in Table 5. As noted earlier, however, the previous-year and subsequent-year patterns are very nearly the same, so the estimates in Table 5 provide a close approximation.

TABLE 8. PERCENT OF FAMILIES WITH ANNUAL EXPENSES ABOVE CATASTROPHIC THRESHOLDS DURING PERIODS OF ONE TO THREE YEARS

	Threshold			
	$3,000	$5,000	$10,000	$20,000
During Any One Year	11	6	2	0.5
At Least Once During Two Years	20	10	3	0.8
At Least Once During Three Years	27	14	4	1.3

EXAMPLES OF EXPENSES EXTENDING MORE THAN ONE YEAR

Although high-cost families, on average, show a building up of expenses before the catastrophic year and a slow decline in expenses in subsequent years, individual patterns vary greatly. Some may have expenses mirroring the aggregate pattern--a gradual build-up to a catastrophic year, followed by a gradual decline--but many do not. The expenses of some families revert to very low levels after a catastrophic year. Other families experience a continuing build-up of expenses even after a catastrophic year. Still others have long-term high expenses but exceed a given catastrophic threshold only intermittently. Even when a family includes only one individual who alone exceeds the threshold, the expenses of two or several people can contribute substantially to its pattern.

This section describes a number of case histories taken from the data used in this report. The cases were not chosen to be typical, but rather to illustrate some of the diverse patterns that occur. All expenses in the case histories are expressed in 1982 dollars.

Intermittent Expenses Above the Threshold

Some families exceed a given catastrophic threshold intermittently because of a chronic illness that generates lower expenses in some years than in others. Some forms of cancer can generate

this pattern of expense. For example, one family in the data had this pattern because the father had skin cancer. In 1976 and 1978, the family would have exceeded a $20,000 threshold (with expenses of $29,000 and $21,000, respectively), primarily because of the father's condition. In 1977, however, his treatment was less extensive; despite one surgical admission that year, the family's expenses fell short of $9,000 and so would not have met even a $10,000 threshold.

In some other instances, families exceed a threshold intermittently because of several different illnesses. In some cases, including some in which a second illness affects the same person, the different illnesses are separated by some time. A striking case involved a five-person family with generally very low claims that exceeded a $20,000 threshold in both 1976 and 1978, the first time because of a cerebrovascular condition affecting the father, and the second time because of an injury that required the father to undergo repeated pelvic and hip surgery. In the intervening year, the family's claims were roughly $400--about one-third of the average.

More important for policy, however, are instances in which two or more illnesses affect different individuals but in which the periods during which the illnesses occur overlap to a substantial degree. Such cases would be treated very differently by catastrophic health insurance plans, depending on whether reimbursement was based on individuals' or families' expenses. For example, in some cases, an individual has a long-term illness that generates expenses that are high but below the threshold for some time after the catastrophic year. In such cases, sizable expenses from another family member may again push the family above a threshold based on family expenses in some later year. In one case of this sort, a chronically ill husband generated expenses well above a $10,000 threshold in 1976. He remained ill thereafter, and in 1978 he generated expenses of about $5,800--far above the average, but well below the threshold. That year, however, his wife generated expenses of more than $8,000 because of a heart condition, pushing the family well above the $10,000 threshold again.

Expenses Persistently Above the Threshold

Masked by the aggregate pattern of gradually declining expenses are an appreciable number of high-cost families whose expenses remain similar or increase substantially for a year or more after a catastrophic year. As noted earlier, from 12 to 27 percent of

high-cost families exceed the same threshold in the subsequent year, and from 8 to 24 percent exceed it again the year after.

Some of these families show consistent expenditures over a long period. One family in the data, for example, incurred expenses between $15,000 and $19,000 in each of the last three years of the data, most of which resulted from a blood disorder of a young child. The period of the study ended when the child was three and a half, so it is not clear how long such expenses persisted. It is possible, however, that they continued for some additional time.

In other cases, families exceed a threshold persistently for several years because of expenses that escalate as illness progresses. These cases, which are particularly relevant to the debate over the value of "heroic" care, are exemplified by the experiences of some cancer patients. For example, one of the highest-cost cases in the data was the family of a teenaged girl with lymphatic cancer. By 1974--the first year of data--the girl was already seriously ill, and expenses for her care alone amounted to about $46,000 that year. The following year her expenses increased to about $60,000. Thereafter, her expenses escalated rapidly, and she incurred nearly $90,000 in expenses in the first two and one-half months of 1976--apparently, the last two and one-half months of her life.

In some instances, families exceed a threshold two years in succession, not because of a chronic illness but rather because of two unrelated acute illnesses that follow each other closely. In general, such cases contribute proportionately less to the recurrence of high-cost illness when high thresholds are used. Even when a $20,000 threshold is used, however, some such cases arise. A particularly striking case in the data used here involved two seemingly coincidentally similar illnesses striking a husband and wife within two years. The husband suffered from ischemic heart disease (restricted blood flow to the heart muscle) throughout the study. In 1974, he was hospitalized for six days, but his expenses were not major. During 1975 and 1976, he filed no claims at all. In 1976, his wife, who had filed only minor and apparently unrelated claims previously, developed rheumatic fever. She was hospitalized for three weeks, during which she had cardiovascular surgery and amassed over $25,000 in expenses. She apparently recovered, for her claims in 1977 and 1978 were again small. In 1977, however, the husband's ischemic heart disease flared; he was hospitalized repeatedly over a seven-month period, underwent cardiovascular surgery, and accumulated $24,500 in expenses.

CHAPTER IV. TRENDS IN EXPENDITURES FOR HIGH-COST ILLNESS

This chapter analyzes the extent to which expenditures for high-cost illness grew during the period of the study (1974-1978).

Importance for Policy

Increases in expenditures for high-cost illness would have wide-reaching implications for health policy. They would drive up the costs of private or public insurance coverage of catastrophic expenses and might exacerbate the problem of uninsured "bad debts." Moreover, such increases would produce an increasing concentration of medical-care resources in high-cost care. (That is, while the total resources committed to lower-cost care would also increase, the proportion of health-care resources devoted to high-cost illness would rise.) This would have implications not only for the equity and efficiency of health-care delivery but also for a variety of policies intended to contain health-care expenditures, such as greater use of cost sharing.

Major Findings

In the non-elderly, non-poor population, high-cost illness increased steadily and rapidly over the period 1974 through 1978. For example, the proportion of families with expenses above $10,000 (in nominal dollars) increased 236 percent. This increase in high-cost illness substantially outpaced growth in median income or general prices over that period. Even after adjusting the thresholds to keep pace with rising incomes, the proportion of families exceeding the catastrophic thresholds increased 48 to 82 percent over the five-year period, depending on the threshold used to delineate high-cost illness.

Most of the increase in high-cost illness in the non-elderly, non-poor population, however, reflected an overall increase in medical expenditures rather than an especially rapid rise in expenditures for high cost illness. Although expenditures for high-cost illness did rise faster than did total medical expenses, this disproportionate growth was relatively small. For example, when families were ranked by their annual medical expenses, the top 10 percent of families accounted for 65 percent of all expenses in 1974, and 67 percent of expenses in 1978.

Since it was relative small, this disproportionate growth of high-cost illness contributed very little to the total increase in medical-care costs over the period included in the study. Had there been no disproportionate growth in high-cost illness, total medical expenditures would have grown 61 percent rather than the 66 percent observed during the five-year period.

Accordingly, high-cost illnesses contributed to the growth of medical expenditures in rough proportion to their contribution to current expenses. For example, the total expenses of families exceeding a $10,000 threshold accounted for about 30 percent of the growth in total expenditures during the period covered by the study, just as they currently account for about 30 percent of annual expenses.

Over the long term, however, the cumulative effects of the small disproportionate growth in high-cost illness could be striking. For example, if present trends continued, the 1 percent of families with the highest expenses in any one year--who accounted for 22 percent of total expenses in 1978--would account for perhaps 35 percent of total expenses by the end of the century.

WAYS OF VIEWING CHANGES IN HIGH-COST ILLNESS

Several different approaches can be used in describing changes in the extent of high-cost illness. One approach is to assess changes in the proportion of total medical expenses attributable to the families with the highest expenses. For example, families could be ranked in terms of their annual expenses, and the proportion of total expenses attributable to the top 20 percent of all families could be compared from year to year. An alternative approach is to assess changes in the proportion of families exceeding various catastrophic thresholds. In this case, the thresholds could be left constant (in nominal dollars) or could be adjusted to keep pace with any of a variety of indexes--for example, median family income or average medical expenditures.

Changes in expenditures for high-cost illness can reflect, in part, demographic trends such as changes in age distribution or family composition. The data used here do not permit an assessment of the aggregate effects of such changes in the population under consideration (the non-elderly, non-poor). Accordingly, demographic factors are held constant in the following analyses of trends in high-cost illness. It is unlikely, however, that demographic changes in the non-elderly population would produce major changes in the incidence of high-cost illness over the short

term.[1] (In the population as a whole, however, demographic changes are probably quite important, because of the growth in the elderly population.)

CHANGES IN EXPENSES ATTRIBUTABLE TO HIGH-COST FAMILIES

Over the five-year period of the study, the proportion of medical expenses attributable to high-cost families increased only slightly. When families were ranked in terms of their annual expenses, this growth was discernible only among the top 20 percent of families and was most pronounced among the families with the highest expenses (see Table 9). Even among the 1 percent of families with the highest expenses, however, the growth was quite small. In 1974, those families accounted for 20 percent of medical expenses; by 1978, their share had risen to 22 percent.

One implication of these findings is that expenditures for high-cost illness are growing only slightly faster than medical expenses in general and that disproportionate growth of high-cost illness has recently made only a minor contribution to the overall growth in medical expenditures in the groups considered. This point is discussed in more detail in the final section of this chapter.

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1. For example, the Social Security Administration estimates that from 1977 (the next-to-last year of data used here) to 1990, the 20-24, 45-54, and 55-64 year-old age groups will decline as percentages of the total population aged 20 through 64. The 25-34 group and especially the 35-44 group will increase as percentages of the whole. In other words, the youngest and oldest groups, with the lowest and highest incidence of high-cost illness, will shrink in percentage terms, while the intermediate age groups, with intermediate incidence of high-cost illness, will increase. These trends will tend to cancel out in terms of their impact on the incidence of high-cost illness. See Social Security Administration, United States Population Projections for OASDHI Cost Estimates (Actuarial Study No. 77), Table 12F (1978), and Social Security Administration, Population Projections, 1981 (Actuarial Study No. 85), Table 20C (1981).

TABLE 9. PERCENT OF TOTAL MEDICAL EXPENSES ATTRIBUTABLE TO FAMILIES WITH THE HIGHEST EXPENSES, 1974 AND 1978

Families, ranked by expenses	1974	1978
Top 25 Percent	91	91
Top 20 Percent	85	86
Top 10 Percent	65	67
Top 5 Percent	47	49
Top 1 Percent	20	22

While the proportion of medical expenses attributable to the families with the largest expenses has been growing only slowly in the population groups considered, its growth over the long term could produce a striking increase in the concentration of medical resources on high-cost families. The change would be most marked among the top 1 percent of all families but would be sizable among other high-cost families as well. For example, if these trends continued, the 1 percent of families with the highest expenses--who accounted for 22 percent of expenses in 1978--would account for perhaps 35 percent of expenses by the end of the century. The top 5 percent, who accounted for just under half of all expenses in 1978, would account for 60 percent by that time. This would represent a major reallocation of medical resources.

CHANGES IN THE PROPORTION OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS

In this section, three approaches are taken in assessing changes in the proportion of families exceeding catastrophic thresholds. The first, and simplest, approach leaves the thresholds unindexed--that is, constant, in nominal dollars. The second approach indexes the thresholds to keep pace with changes in median family income. Indexing of this sort, although perhaps informal, could be included in some health insurance plans. The final approach adjusts each year's expenses to a constant (1982)

average. This approach assesses the extent to which there is growth in the incidence of high-cost illness beyond the growth caused by increasing average medical expenses.

The relationship between these three approaches--a rapid rise in high-cost illness when thresholds are left unindexed, a relatively slight rise if thresholds are indexed to average medical expenses, and an intermediate rise if thresholds are indexed to median family income--is illustrated in Figure 3. This Figure charts the percentage increase in the incidence of high-cost illness between 1974 and 1978 using a single threshold ($10,000 in 1974 dollars) and all three indexing approaches. More detail on the effects of the three indexing approaches follows.

Increases in High-Cost Illness in Nominal Dollars

If the effects of demographic changes are removed, but expenses and thresholds are left in current (uninflated) dollars, the incidence of high-cost illness rose sharply from 1974 through 1978. Moreover, the higher the threshold used to define high-cost illness, the more marked was the rise in incidence (see Table 10). The proportion of families exceeding a $3,000 threshold increased 138 percent (24 percent a year), from about 2 percent of all families in 1974 to nearly 6 percent of all families in 1978. The proportion of families exceeding a $5,000 threshold increased 189 percent (30 percent per year), and the proportion exceeding $10,000 increased 236 percent (35 percent per year). At these rates, the percentage of families exceeding a $3,000 threshold doubles in about three and a quarter years, and the percentage exceeding $10,000 doubles in less than two and a half years.[2]

Increasing Incomes

For the average family, the increase in high-cost illness described in the previous section was partly offset by increasing family incomes. During the period covered by the study, median family income increased by 37 percent (about 8 percent per year).

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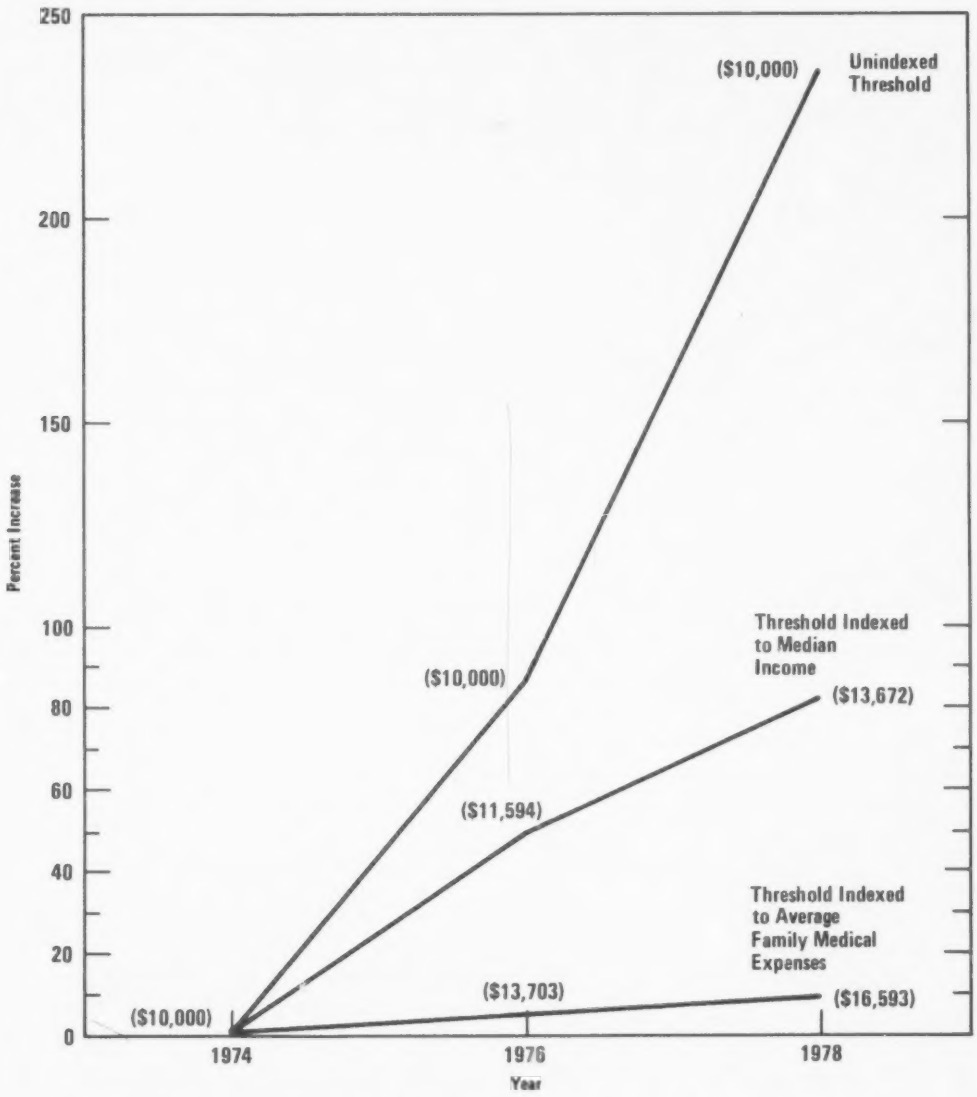
2. The $20,000 threshold is not discussed here because the small number of families exceeding that level, especially in 1974 and 1975, makes an estimate of incidence above that level unreliable.

Figure 3.

Illustrative Percent Increases in the Incidence of High-Cost Illness, Using Unindexed and Indexed $10,000 Thresholds



NOTE: Initial threshold values are $10,000, in 1974 dollars. All threshold values (in parentheses) are expressed in current (nominal) dollars.

TABLE 10. PERCENT OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, HOLDING DEMOGRAPHIC FACTORS CONSTANT

Threshold	1974	1975	1976	1977	1978	Percent Change, 1974-1978
$ 3,000	2.34	3.11	4.01	5.08	5.58	138
5,000	0.84	1.17	1.62	2.01	2.43	189
10,000	0.22	0.29	0.41	0.60	0.74	236
20,000	0.04[a]/	0.03[a]/	0.10	0.12	0.15	275[a]/

NOTE: All values in current (nominal) dollars.

a. Unreliable estimates because of small groups above the threshold.

Adjusting the catastrophic thresholds to keep pace with median income markedly reduced the growth in high-cost illness (see Table 11 and Figure 4; compare with Table 10). Nonetheless, the growth in the incidence of high-cost illness remained substantial. From 1974 through 1978, the proportion of families with expenses above the lowest threshold ($3,000 in 1974, rising to about $4,100 in 1978) increased about 48 percent, or 10 percent per year. The proportion with expenses above a higher threshold ($10,000 in 1974, rising to $13,700 in 1978) increased 82 percent, or 16 percent per year.

Increases in High-Cost Illness Relative to Average Medical Expenses

In recent years, average expenditures for medical care have increased substantially more rapidly than either median income or prices in general. From 1974 through 1978, average expenses for covered services in the sample used here increased 66 percent (13.5 percent per year), when the demographic composition of the sample was held constant. This compares to a 32 percent change in the Consumer Price Index and a 37 percent increase in median family income. This rapid rise in medical expenditures will increase

Figure 4.

Percent of Families Exceeding Catastrophic Thresholds, Holding Median Family Income and Demographic Factors Constant, by Threshold

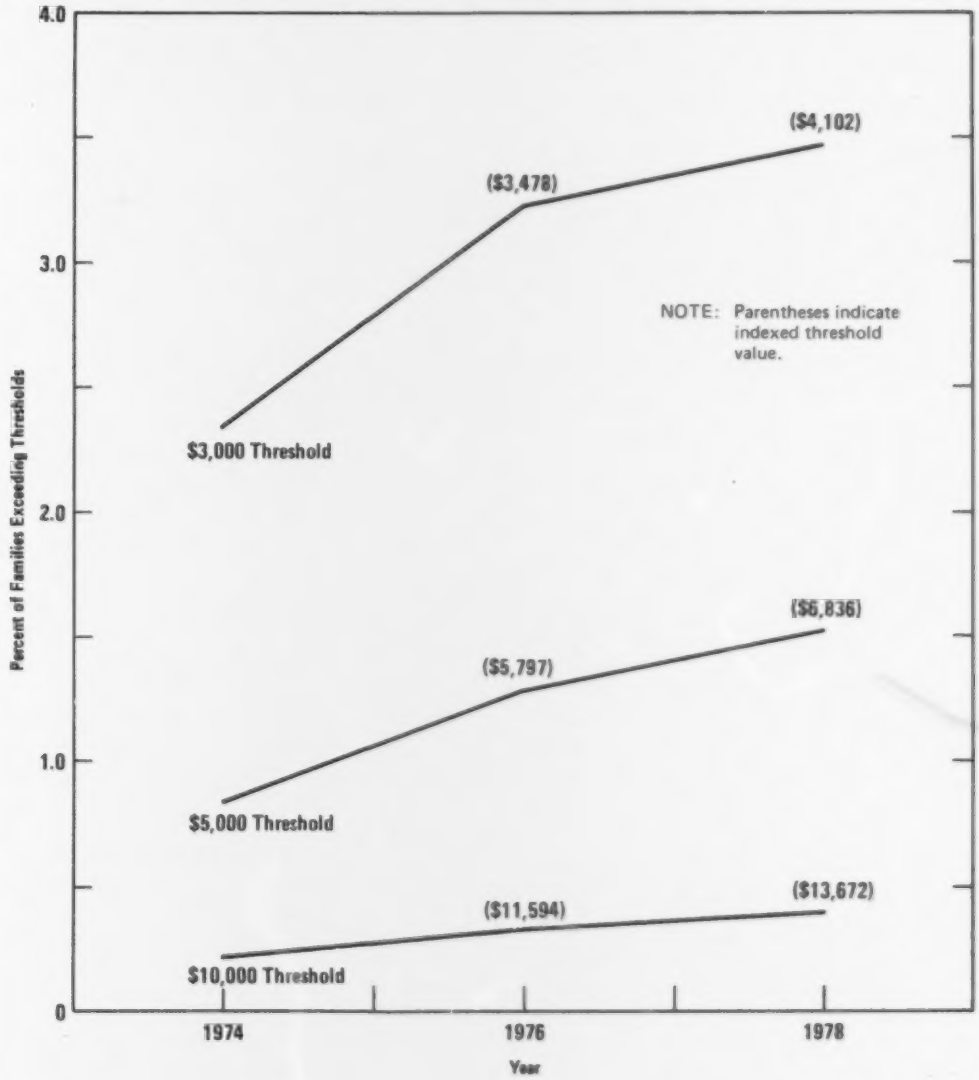


TABLE 11. PERCENT OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, HOLDING MEDIAN FAMILY INCOME AND DEMOGRAPHIC FACTORS CONSTANT

Thresholds		Percent of Families		Percent Change,
1974	1978	1974	1978	1974-1978
$ 3,000	$ 4,102	2.34	3.47	48
5,000	6,836	0.84	1.53	82
10,000	13,672	0.22	0.40	82
20,000	27,345	0.04[a]	0.07	75[a]

NOTE: All values in current (nominal) dollars.

a. Unreliable estimates because of small group above the threshold.

ly income. This rapid rise in medical expenditures will increase the incidence of high-cost illness--both in nominal terms and relative to income--even if expenditures for high-cost illness grow no more quickly than other medical expenditures.

This section assesses whether there was growth in high-cost illness between 1974 and 1978 above and beyond the growth caused by increases in total or average medical expenses. In other words, it gauges whether expenditures for high-cost illness have grown disproportionately, relative to the growth of medical expenditures in general. To assess this, medical expenses were inflated so that each year's mean expense was the same. Both these inflated expenses and the threshold amounts are expressed below in 1982 dollars.

Between 1974 and 1978, expenditures for high-cost illness rose faster than expenditures for all covered services, but the difference was relatively small. This is shown by growth in the percentage of total expenses attributable to expenses above the thresholds, holding average expenses constant across all five

years (see Table 12). Viewed as a percentage of total covered medical expenses, expenses above either a $10,000 or a $20,000 threshold increased by about 20 percent. This corresponds to an annual increase of between 4 and 5 percent. If $3,000 or $5,000 thresholds are used, the increases are much smaller, roughly 5 and 11 percent, respectively, over the five-year period.

TABLE 12. EXPENSES ABOVE CATASTROPHIC THRESHOLDS AS PERCENT OF TOTAL EXPENSES, HOLDING AVERAGE MEDICAL EXPENSES AND DEMOGRAPHIC FACTORS CONSTANT

Threshold	1974	1975	1976	1977	1978	Percent Change, 1974-1978
$ 3,000	37.8	37.6	38.1	38.2	39.7	5
$ 5,000	23.8	23.8	24.7	24.9	26.3	11
$10,000	11.0	10.6	12.2	12.6	13.3	21
$20,000	4.5	3.7	5.2	5.5	5.3	18

NOTE: Average expenses for all years adjusted to 1982 average.

Over the five-year period, the incidence of high-cost illness also increased when each year's expenses were adjusted to a constant (1982) average, but only if the higher thresholds were used to define high-cost illness (see Table 13; compare Table 10). The proportion of families exceeding the lower thresholds ($3,000 and $5,000) actually declined slightly. The proportion of families exceeding $10,000, however, increased about 13 percent, or 3 percent annually. The major change occurred in the proportion of families exceeding $20,000; this increased 33 percent over the period, an average of over 7 percent annually.

This pattern confirms the earlier conclusion that the growth in incidence of high-cost illness--either in nominal terms or relative to incomes (Tables 10 and 11)--is primarily a result of increases in the average cost of medical care. Increases in high-cost illness above and beyond those caused by the rising

TABLE 13. PERCENT OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS, HOLDING AVERAGE MEDICAL EXPENSES AND DEMOGRAPHIC FACTORS CONSTANT

Threshold	1974	1975	1976	1977	1978	Percent Change, 1974-1978
$ 3,000	11.1	11.0	10.8	10.7	10.6	-5
$ 5,000	5.4	5.5	5.2	5.2	5.2	-4
$10,000	1.5	1.6	1.5	1.5	1.7	+13
$20,000	0.36	0.37	0.38	0.41	0.48	+33

NOTE: Average expenses for all years adjusted to 1982 average.

average cost of medical care play a small role, except when the highest ($20,000) threshold is used. In that instance, disproportionate increases in high-cost illness relative to average medical care costs contribute roughly 10 percent of the nominal increase in high-cost illness, and about 40 percent of the increase relative to incomes.

THE CONTRIBUTION OF HIGH-COST ILLNESS TO THE OVERALL INCREASE IN MEDICAL EXPENDITURES

Although the increase in high-cost illness relative to medical expenses is appreciable in percentage terms when the highest threshold is used, very little of the overall increase in medical expenses can be attributed to this disproportionate growth in high-cost illness. For example, had expenses above a $20,000 threshold increased at the same rate as expenses below $20,000, total expenses would have grown about 65 percent instead of the 66 percent observed. Similarly, had expenses above a $3,000 threshold grown at the same rate as expenses below $3,000, total expenses would have grown about 61 percent.

That the disproportionate growth in high-cost illness contributed little to the overall increase in medical expenditures, however, does not indicate that high-cost illness itself played little role in that increase. Rather, it indicates that high-cost illness contributed to the total growth in expenditures in rough proportion to its contribution to current expenditures. For example, the total expenses of families exceeding a $10,000 threshold contributed roughly 30 percent of the increase in total expenditures, just as they accounted for roughly 30 percent of current expenses. Likewise, the portion of their expenses above that threshold accounted for about 13 percent (see Table 1 in Chapter II). The total expenses of families exceeding $20,000 contributed roughly 14 percent of the total increase in expenditures, and their expenses above that threshold contributed about 5 percent of the total increase.

CHAPTER V. IMPLICATIONS FOR FEDERAL POLICY

The patterns of high-cost illness analyzed in the preceding chapters have important implications for several areas of health policy, including the allocation of medical care resources, catastrophic health insurance, and the control of medical-care costs.

THE ALLOCATION OF MEDICAL RESOURCES

Many of the issues raised about high-cost illness fundamentally concern the allocation of medical resources. For example, many question the extent to which resources are concentrated on high-cost illnesses and whether that concentration is growing more pronounced over time.

This paper confirmed the common expectation that in the non-elderly, non-poor population, a sizable proportion of medical resources are concentrated within any one year on a relatively small number of high-cost families. For example, the 11 percent of families with annual expenses over $3,000 account for fully two-thirds of total medical expenses.

On the other hand, the multiyear analyses in Chapter III indicated that such a one-year view is in some senses misleading, in that it overstates the concentration of medical resources on a few families. Because of the rapid turnover among high-cost families, a far larger proportion of families experience at least one high-cost year during a period of several years. For example, fully a fourth of all families have annual expenses above $3,000 at least once during a period of three consecutive years, and the proportion exceeding that threshold over a longer period--say, a decade--is presumably substantially higher.

This pattern of rapid turnover has important implications for understanding the subsidies inherent in health insurance, whether private or public. A one-year view of the data gives the impression that there is a very large subsidy of a small number of high-cost families by a much larger number of low-cost families. Over the long term, however, some of these low-cost families are in effect subsidizing their own past or future high-cost years. That is, many of the families subsidizing high-cost families in one year will in turn be subsidized, often by the same families, at a later date.

In the non-elderly, non-poor population, the concentration of medical resources on high-cost families is growing, but only slowly. For example, the 5 percent of families with the largest expenses accounted for 47 percent of total expenses in 1974, and 49 percent in 1978. This contradicts a widely held assumption that expenditures for high-cost illness are growing substantially more rapidly than medical expenditures in general in this part of the population. Nonetheless, over the long term--say, the remainder of the century--continuation of current trends would produce a very marked increase in the concentration of resources in the care provided to families experiencing high-cost years. The effects on health status of such a change in the allocation of resources are not clear, however.

CATASTROPHIC HEALTH INSURANCE

The analyses in Chapters II and III of the incidence of high-cost illness indicate the need for protection against the expenses of high-cost illnesses, in that a sizable proportion of non-elderly, non-poor families would face catastrophic financial burdens in its absence. If the historical trends examined in Chapter IV continued, however--in particular, if medical expenditures continued to rise substantially more rapidly than families' incomes--the cost of any given amount of protection against catastrophic expenses would rise rapidly. Alternatively, if the costs of a catastrophic insurance plan, either private or public, were held constant, the protection offered by the plan--relative to families' incomes--would fall sharply. This dilemma would arise regardless of the plan's original cost. Moreover, any likely indexing of the plan--for example, adjusting its provisions to keep pace with rising incomes--would only ameliorate, but not solve, the problem.

If the amount of protection under such a plan was maintained, the resulting increase in costs would have two parts. The catastrophic expenses of the typical high-cost family--and hence its benefits under a catastrophic insurance plan--would grow rapidly. In addition, a growing proportion of families would exceed any given catastrophic threshold and therefore qualify for benefits. Thus, the growing financial burden of catastrophic illness would be transferred to the shrinking proportion of families that were not affected by such illnesses.

This steep rise in the cost of catastrophic insurance would erode one of the important reasons why some proponents have supported catastrophic insurance proposals. Some proponents have maintained that increased or universal catastrophic insurance

would protect affected families from the most burdensome medical expenses, while keeping the cost of this increased protection relatively low. Over the long term, however, costs could be kept low only by reducing coverage, thereby again increasing the financial burden on affected families or--through the mechanism of bad debts--on governments, other patients, or others paying insurance premiums.

COST CONTAINMENT

The patterns of expenditures discussed in the previous chapters suggest that several possible strategies for containing the costs of medical care face serious limitations.

One strategy that would probably have only limited effectiveness would be to focus cost-containment efforts primarily on only high-cost illness. Considerable attention has been devoted recently to the escalation of expenditures for high-cost care--particularly, "heroic" care of the terminally ill--and some have suggested that a failure to control expenditures for heroic care is a major cause of the current increase in medical expenditures.[1] In the segment of the population studied here, however, expenditures for low-cost and high-cost illness grew at nearly the same rate, and the small disproportionate growth of expenditures for high-cost illness contributed little to the overall increase in expenditures.[2]

Reducing the growth of heroic and other high-cost care to a rate lower than the growth of other medical expenses would have a correspondingly larger effect, but even that would likely leave most of the problem of rising costs unsolved. For example, if growth of expenditures above $3,000 during the five years covered by the study had been held down to the rate of the increase in median family income--a far slower rate of increase than that shown by other medical expenses--the overall growth in medical

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1. For example, see Ezekiel Emanuel, "The Kidney Experiment," The New Republic (August 30, 1982), pp. 12-14.

2. As noted earlier, if there had been no disproportionate growth in expenditures above $3,000 per year--which includes far more than those treatments that most would call heroic--the overall growth in expenditures would have been 61 percent instead of the observed 66 percent during the five-year period covered by the study.

expenditures would have been reduced to 52 percent from the observed growth of 66 percent.

More generally, the findings in the previous chapters suggest the fruitlessness of attempts to identify limited subgroups of the population that are particularly responsible for the rise in medical costs and to make such groups bear the brunt of cost-containment efforts. Within the non-elderly, non-poor, employed population, there appear to be no such limited groups, in that the increase in medical expenditures is nearly uniform. This does not imply that there are no specific types of care or technologies that contribute disproportionately to the rise in medical costs. It suggests, however, that the impact of such technologies and types of care, taken together, are diffused throughout the entire distribution of medical expenses, affecting low-cost, moderate-cost, and high-cost families nearly equally.

These conclusions, however, are subject to one caveat. It is possible--but not certain--that heroic treatments play a different role in the growth of expenditures among the elderly, who were excluded from this report.

The rapidity and uniformity of the increase in medical expenditures also suggest that although increased cost sharing could have a sizable impact on the growth of medical expenditures in the short term, the long-term prospects of this cost-containment mechanism are more problematic. Over the long term, the effectiveness of cost sharing as a cost-containment mechanism could be maintained only by allowing the cost-sharing burden to grow substantially from any level set currently.

In recent years, cost-sharing provisions in both private insurance and legislative proposals have focused increasingly on low and moderate expenses. The imposition of sizable deductibles has been one means of accomplishing this. In addition, cost-sharing is often capped (by means of a "stop-loss" provision), so that once expenses reach a specified amount, no further coinsurance is imposed. This protects families from the largest medical expenses, while leaving the bulk of total medical expenses subject to the restraining influence of cost sharing.

If medical expenditures continue to rise substantially more rapidly than incomes, however, it will be impossible to maintain whatever balance is established initially between effectiveness and burden on affected families. If the cost-sharing provisions were adjusted to maintain their impact in the face of rapid cost increases, the burden faced by many families would increase

rapidly. If, conversely, the provisions were adjusted to avoid increases in the burden faced by many families, the proportion of total expenses subject to cost sharing--and, accordingly, the impact of the cost-sharing provisions on the growth of total expenditures--would rapidly decline. In this case, the restraint on medical expenditures could be maintained only by bringing additional cost-containment mechanisms to bear.

For example, if cost-sharing provisions were indexed to keep pace with family incomes, the real maximum burden faced by families with expenses above the "stop-loss" would remain constant. The proportion of total medical expenses subject to cost sharing, however, would fall rapidly, because an ever greater proportion of expenses would lie above the stop-loss limit. The aggregate impact of cost sharing on the growth of medical expenditures would therefore decline. Nonetheless, the average financial burden on families who fail to reach the cost-sharing limit would rise, for the average expenses of these low- and moderate-cost families would rise faster than their incomes.

Finally, the unusually large subsequent-year expenses of many high-cost families (Chapter III) indicate a sizable potential for "adverse selection" (or "anti-selection") in cost-containment proposals that rely on consumer choice among competing insurance plans.

Adverse selection refers to the tendency of families to choose insurance plans on the basis of their anticipated expenses. Families expecting major expenses would find it in their interest to select plans with extensive benefits, even if the premium costs are higher. Families expecting only minor expenses, on the other hand, could save premium costs by choosing plans with relatively limited benefits. The effect of adverse selection is to drive up the cost of relatively extensive plans relative to the average value of their benefits, gradually making them less competitive.

To some extent, many high-cost families may be able to anticipate their subsequent large expenses and may therefore contribute substantially to adverse selection. Not all high-cost families, of course, will anticipate their future expenses, and some may fail to make the financially most advantageous choice of plans regardless. Many, however--for example, some of the families of cancer patients or individuals with chronic heart disease described in Chapter III--would correctly anticipate continued

large expenses, and the magnitude of those expenses would provide them with a strong incentive to choose a plan with extensive benefits.[3]

3. Moreover, the fact that their subsequent-year elevation of expenses is largely not attributable to demographic factors indicates that insurers could not protect themselves against this source of adverse selection by charging varied premiums to families with different demographic characteristics.

APPENDIXES

APPENDIX A. DATA AND METHODS

This report is based on the claims data of the Blue Cross-Blue Shield Federal Employees Health Benefit Plan for the years 1974 through 1978. These data were selected for several reasons:

- They include enough families to permit reliable analysis of low-frequency, high-cost illnesses[1];
- They permit following individuals and families over a period of years; and
- They are relatively complete records of family medical expenses, because the Blue Cross-Blue Shield plan provides extensive coverage.

In all cases, all covered expenses reported to Blue Cross were included in the data, regardless of whether the expenses were paid out-of-pocket by the family (because of cost sharing), reimbursed by another insuror, or reimbursed by Blue Cross. It has often been noted, however, that in insurance plans with deductibles, some families with small expenses do not bother reporting their expenses to the insuror. Since this Blue Cross-Blue Shield plan did impose a deductible on some expenses, some small covered expenses were presumably not reported. This should have no substantial effect, however, on analyses of high-cost illness.

Several categories of families were deleted from the data before analyses were conducted. In most cases, the deletions were designed to make the sample more comparable to the population of interest (the non-elderly, non-poor employed; see Chapter I).[2] All contracts headed by an individual aged 65 or older were

1. The data include claims records of over three million contracts, but only a small fraction of those records were used, as explained below.

2. More specifically, the population of interest was defined as families headed by non-elderly individuals employed full time and earning at least $7,200 in 1978 dollars.

deleted. All annuitants (including both retirees and survivors) were deleted in order to remove disabled workers, who were not germane to the study. (The set of annuitants aged 64 or less includes able-bodied early retirees, some of whom would have been germane to the study because they might have remained employed had they been in the private sector. The data, however, did not distinguish between able-bodied and disabled annuitants, so it was necessary to exclude all annuitants.) Finally, families that chose the "low option" plan were excluded for technical reasons.

Once these groups had been excluded, a variety of random samples of families were drawn. Most of the analyses reported below are based on samples of between 127,000 and 141,000 families, depending on the year. In some cases, when such large samples were not required to obtain reliable estimates, subsamples of between 15,000 and 20,000 families were used.

A separate sample was defined for each year, consisting of two groups: (1) those contracts active for the entire year, and (2) contracts active at the beginning of the year but terminating during the year. The latter group was incorporated because it includes contract holders who died during the year--a group that should ideally be included in any analysis of catastrophic illness. (In practice, however, it made little difference whether such cases were included or excluded.)

In most cases, the yearly samples were then weighted to reflect a constant (1980) demographic mix. This was done by dividing each yearly sample into 495 cells defined by region, age of contract holder, family size, and sex of contract holder.[3]

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3. All "self-only" contracts were treated as unmarried individuals. In practice, some individuals with self-only contracts are married. For example, it is sometimes advantageous for a married couple with no children, if both individuals are working, to purchase separate self-only contracts rather than one family contract, since the premium for family contracts includes costs for coverage of children. It is not possible, however, to distinguish such instances from true single-person families. Treating all self-only contracts as if they were single individuals may bias average expenditures downward, since some married individuals with self-only contracts are also covered by a family contract and may submit their claims to the insuror of the latter contract. When Blue-Cross had record of such occurrences (through

(Continued)

Each observation was weighted so that the weighted number of families in each cell in each sample equalled the number of families in 1980 in the corresponding cell of the population of interest.

Once the data were weighted to a constant demographic mix, they were inflated so that the average family expense was constant from year to year. For convenience, these "constant-dollar" expenses are expressed in 1982 dollars. This inflation was accomplished in two steps. First, each year's data were inflated to 1978 (the latest year of data) by multiplying every expendtiure by the ratio of the average annual family expense in 1978 to the average in the year in question. Second, all expenses were multiplied by a factor reflecting projected increases in covered expenditures in this population from 1978 to 1982.

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3. (Continued)
"co-ordination of benefits" provisions), the expenses involved were incorporated into the analyses reported in this paper. When Blue Cross had no record of such expenses, however, the total annual expenditures for the individual involved were underestimated.

APPENDIX B. ATTRITION AND ACCRETION

In almost all longitudinal studies--that is, studies using data that extend over a period of time--some cases are lost between the first collection of data and the last. This gradual loss of cases, generally called "attrition," can cause substantial bias if the cases that are lost are numerous and differ systematically from those that remain. In some longitudinal studies, a parallel source of potential basis is caused by cases that enter the data base during the period being studied. This gradual addition of cases can be called "accretion."

This appendix describes the sources of attrition and accretion in the data base used in this report and evaluates their importance. Three questions are addressed:

- What proportion of cases left or joined the data base during the five years covered by the study?
- How do the attrition and accretion groups differ from the cases remaining in the data base for the full five years? and
- What amount of bias do attrition and accretion produce?

The analyses found that attrition and accretion were present and that the attrition and accretion groups differed from those families that remained in the sample. The amount of bias caused by attrition and accretion, however, while varying from analysis to analysis, is typically very small. Both the relatively small size of the attrition and accretion groups and the way in which the analyses were conducted contributed to the small size of the bias.

For the sake of clarity, the extent of attrition and accretion within a single year are first analyzed separately. Those sections are followed by an analysis of the joint effects of attrition and accretion in two- and three-year samples. A subsequent section considers the effects of attrition and accretion on the analyses of historical trends in Chapter IV. A final section describes how attrition-related demographic factors were controlled in this report.

LIMITATIONS OF THIS APPENDIX

This appendix is designed solely to assess attrition and accretion as they affect the analyses reported in this paper. It is not a comprehensive analysis of the characteristics of those joining or leaving the Federal Employees' Blue Cross plan, and it is even less a comprehensive analysis of "plan-switching" in the federal employees' health benefit program as a whole.

The analyses in this appendix were designed to parallel as closely as possible those reported in this paper. Accordingly, they exclude:

- o all contracts headed by individuals over the age of 64;
- o all low-option contracts, insofar as they could be identified;[1] and
- o in most instances, all mental health expenses, except where noted otherwise.

In addition, several of the analyses in this Appendix exclude all contracts headed by annuitants, and others hold annuitant status constant by statistical means.

The analyses presented here consider primarily attrition and accretion in 1976, 1977, and 1978. This reflects the fact that the analyses in the body of this paper relied most heavily on data from those years. It is also important to note that patterns of attrition and accretion may change over time. Such changes could result from many factors, including changes in the premiums and benefits of competing insurance plans, changing composition of the work force, and the aggressiveness of marketing efforts. There is evidence, for example, that older workers, and those who have been in the Blue Cross plan longer, are less likely to change to other plans. This suggests that attrition rates may increase over time, as such workers are replaced by younger workers with less tenure. There is also evidence that the characteristics of those changing plans may have varied in recent years depending on relative changes in benefits.

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1. Contracts that were high-option at the beginning and end of the five-year period (or at the beginning and end of the contract's life) but low-option for some periods in between could not be distinguished from other high-option contracts.

SOURCES OF ATTRITION AND ACCRETION

The patterns of attrition and accretion in this paper are determined by the use of insurance claims as the data base. Attrition can be caused by:

- o termination of federal employment;
- o death;
- o voluntary cancellation of insurance coverage; or
- o changing to a different federal employees' insurance plan.

Accretion can be caused by:

- o commencement of federal employment;
- o initiation of insurance coverage by a previously uninsured federal employee; or
- o changing from a different federal employees' insurance plan.

Some of these events (for example, change in employment) can occur at any time, but others (for example, initiation of insurance by a previously uninsured employee) can only occur at times specified by the federal government. Several other factors that contribute to attrition in most longitudinal studies (for example, changes in residence) have no effect in this data base.

ATTRITION: WHO LEFT THE PLAN, AND HOW MUCH BIAS DO THEY CAUSE?

Patterns of attrition were examined by comparing the contracts that became inactive during 1978 with those that were active for that entire calendar year. A total of 16,335 contracts were included in this part of the analysis.

About 4.7 percent of the contracts that were active at some time during 1978 became inactive during the calendar year (see Table B-1). Nearly 40 percent of the cases of attrition--1.8 percent of all contracts--involved families changing to other federal health insurance plans during "open season," an annual period during which all federal employees are free to cancel their existing coverage and join any other federal plan. The remainder became inactive for a variety of reasons, including death, leaving federal employment, and voluntary cancellation of insurance coverage. Although the open season is held in the last quarter of each year, changes made at that time become effective at the beginning of the first pay period that starts in the following year. Accordingly, in Table B-1, almost all of the changes to other federal employees' health benefit (FEHB) plans occurred during the

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TABLE B-1. ATTRITION IN 1978, BY REASON FOR LEAVING PLAN AND CALENDAR QUARTER (In percent of total contracts, number of contracts in parentheses)

Reason for Leaving	First Quarter	Second Through Fourth Quarters	Total
Changes to other FEHB Plans[a]	1.7 (282)	0.1 (12)	1.8 (293)
Termination[b]	0.5 (86)	1.6 (256)	2.1 (342)
Other (Cancellation of Payroll Office Transfer)[c]	0.2 (37)	0.5 (89)	0.8 (127)
Total	2.5 (405)	2.2 (357)	4.7 (762)

NOTE: Components may not sum because of rounding.

a. "FEHB plans" are federal employees' health benefit plans.

b. Terminations do not include cases in which the contract holders voluntarily end participation in the plan. Deaths of contract holders appear as terminations unless surviving family members maintain enrollment.

c. Cancellations include all cases in which the contract holder voluntarily ends participation in the plan.

first calendar quarter. In contrast, attrition for other reasons was distributed approximately uniformly throughout the year.

Characteristics of Those Who Left the Plan

On average, families that left the plan in 1978 had lower medical expenses than those who remained in the plan. The two groups also differed demographically, however, and adjusting for the demographic differences made the expenditures of those who left the plan much more similar to the expenditures of those remaining.

Because the data include no information on the medical expenses of those who left the plan in 1978 (the "attrition sample") after they left, it was necessary to consider only their expenses in 1977, the year before their coverage ended. For the sake of comparability, the expenses of those who remained through 1978 (the "stable sample") were also tabulated for 1977.[2]

The attrition sample as a whole had average annual family expenses about $209 (25 percent) lower than the stable sample in 1977 (see Table B-2). Those who left to change into another federal employees' plan had particularly low expenses--$273 (33 percent) below the stable sample. In insurance terminology, this constitutes "anti-selection" or "adverse selection"--in this case, a tendency for lower-cost contract holders to opt out of the plan, thus driving up the insurer's average benefit payments and premium rates.

TABLE B-2. ANNUAL MEDICAL EXPENSES OF FAMILIES LEAVING THE PLAN IN 1978 AND THOSE REMAINING (In 1977 dollars and percentages)

	All Remaining (Stable Sample)	All Leaving (Attrition Sample)	Changed to Other Plan	Terminated	Other
1977 Expenses	$839	$630	$566	$679	$658
Dollar Difference From Those Remaining	---	-209	-273	-160	-181
Percentage Difference From Those Remaining	---	-25	-33	-19	-22

2. All attrition tabulations reported here excluded mental health expenses, in order to be comparable to the principal analyses reported in the paper. Identical tabulations were also computed including mental health expenses; they are presented in Appendix C.

For purposes of this report, it was critical to ascertain what portion of the attrition sample's lower expenses can be attributed to those demographic factors about which data were available. To the extent that the difference is attributable to such factors, it is possible to make adjustments to remove the potential bias resulting from attrition.

The attrition sample differed from the stable sample with respect to several demographic factors that could affect medical expenses (see Table B-3). The contract holders in the attrition sample were about eight years younger than their counterparts in the stable sample. Annuitants were far less numerous among those leaving the plan than among those remaining, comprising only 7.3 percent of the attrition sample but 24.6 percent of the stable sample. Female contract holders were somewhat more likely than males to leave the plan; female-headed contracts comprised 37.8 percent of the attrition sample but only 30.6 percent of the stable sample. In addition, the average family size in the attrition sample was slightly smaller than in the stable sample: 2.6 versus 2.9 persons.

Multiple regression analysis was used to separate the effects of attrition and demographic factors on expenses. Two basic specifications were used. The first estimated 1977 expenses from a dichotomous attrition variable (left the plan in 1978 vs. did not leave) and the demographic variables available in the data base: age of contract head, sex of contract head, family size, region, and annuitant status. The region variable was a six-way contrast using modified census regions: Northeast, Northcentral, West, "D.C. plus" (the District of Columbia, Maryland, and Virginia), South outside of D.C. plus, and other (territories). Annuitant status was a three-way contrast: employees vs. employee annuitants vs. survivor annuitants. Quadratic forms of age and family size were entered to handle non-linearities. The second specification differed only in that the dichotomous attrition variable was replaced by a set of three variables classifying those who left the plan by their reasons for doing so: changes to other plans, terminations, and other reasons.

After this adjustment for demographic differences, the expenses of those families that left the plan were only $80 (10 percent) lower than the expenses of the stable sample. This $80 difference (which is small enough to be statistically unreliable) compares to a $209 difference before adjustment (see Table B-2).

TABLE B-3. DEMOGRAPHIC CHARACTERISTICS OF STABLE, ATTRITION, AND ACCRETION SAMPLES

Variable	Stable	Attrition	Accretion
Age of Contract Holder (Mean)	45.6	37.4	34.3
Percent Annuitants	24.6	7.3	3.8
Percent Female	30.6	37.8	47.6
Family Size (Mean)	2.9	2.6	2.2

The effect of the adjustment varies, however, with the reason for leaving the plan (see Table B-4). Those who left the plan to enter another federal plan remained $182 (22 percent) below the stable sample, as compared to $273 (33 percent) before adjustment. In contrast, terminations--which include deaths--showed expenses $61 (7 percent) higher than the stable sample after adjustment. The remainder of the attrition sample had expenses $117 (14 percent) lower than the stable sample after adjustment.

TABLE B-4. DIFFERENCES IN EXPENSES BETWEEN ATTRITION GROUPS AND STABLE SAMPLE, BEFORE AND AFTER DEMOGRAPHIC ADJUSTMENTS (In 1977 Dollars and Percentages)

	Group			
	All Leaving	Changed to Other Plan	Terminated	Other
Before Adjustment				
Dollars	-209	-273	-160	-181
Percent	-25	-33	-19	-22
After Adjustment				
Dollars	-80	-182	+61	-117
Percent	-10	-22	+7	-14

NOTE: A minus (-) indicates that the group had lower expenses than the stable sample.

How Much Bias Does Attrition Cause Within a Single Year?

The analysis above indicates the degree to which those who leave the data base differ from those who remain, but it does not directly indicate the amount of bias caused by attrition. The amount of bias depends not only on the differences in expenses between the attrition and stable samples, but also on the frequency of attrition.

In this section, estimates are given of the bias caused by attrition within a single year in estimating average annual expenses. That is, the estimates are of the extent of attrition bias in cross-sectional estimates of average annual expenses. Bias of this sort would affect the results presented in Chapter II.

These estimates can be considered only approximate. As noted above, data on the annual expenses of the attrition sample could only be obtained for the calendar year (1977) before they left the data base. Therefore, it is only possible to estimate the bias that would have been caused had those who left the plan in 1978 been excluded from the analysis in 1977. There is no direct way to calculate the effect their leaving (in 1978) had on the distribution of expenses in 1978 or in subsequent years.

Two methods were used to assess the bias generated by attrition within a single year. The first method compares the average annual expenses in the stable sample to the average in the entire sample, without any adjustment for demographic differences. This provides the higher estimate of the bias caused by a year's attrition. The average annual expense of the stable sample was about $9.50 higher than the $829 average expense of the entire sample. Thus the bias amounts to about 1.1 percent.

The second method of assessing the bias from attrition is to compare the expenses of the stable and entire samples after adjustment for all known demographic differences. This method yields an estimate of bias of about 0.5 percent, about half as large as the estimate of the first method. Concretely, this corresponds to a bias of about $3.75, relative to the average expense of $829.

In practice, the actual attrition bias in cross-sectional analyses reported in this paper is probably close to the lower estimate (0.5 percent), because of the weighting described at the end of this Appendix.

ACCRETION: WHO JOINED THE PLAN, AND HOW MUCH BIAS DO THEY CAUSE?

Patterns of accretion were examined in a way analogous to the analysis of attrition described above, except that different dates had to be used. All contracts that became active in 1977 were compared to those active for all of 1977. Expenses in 1978 were used in the comparison. A total of 16,561 contracts were included in this analysis.

About 7.4 percent of the contracts active during 1977 first became active in that year (see Table B-5). Only about a fifth of all cases of accretion, however, involved families changing from other federal employees' health insurance plans. The remainder were new enrollments--cases in which the contract holder either just began federal employment or had been employed but had previously declined insurance.[3]

TABLE B-5. ACCRETION IN 1977, BY REASON FOR JOINING PLAN AND CALENDAR QUARTER (In percent of total contracts, number of contracts in parentheses)

Reason for Leaving	First Quarter	Second Through Fourth Quarters	Total
Change from Other FEHB Plans[a]	0.7 (108)	0.9 (145)	1.5 (253)
New Enrollment	2.2 (358)	3.7 (614)	5.9 (973)
Total	2.8 (466)	4.6 (759)	7.4 (1,226)

NOTE: Components may not sum because of rounding.

a. "FEHB plans" are federal employees' health benefit insurance plans.

3. As Table B-5 shows, cases in which families had changed from other federal plans were not neatly clustered in the first calendar quarter, when such "open season" transfers are implemented. Many were recorded in the fourth quarter, when the transfers are requested by the employee. It is likely that this is merely a data problem, however, and that most of the changes from other plans are in fact open season changes.

Characteristics of Those Who Joined the Plan

On average, families that joined the plan in 1977 (the accretion sample) had lower expenses than those who were in the plan for the full year (the stable sample). As with attrition, adjusting for demographic differences brought the expenses of the accretion sample more closely into line with the expenses of the stable sample. The two groups in the accretion sample, however--the new enrollments and those transferring in from other federal employees' plans--showed very different patterns of expenses.

The accretion sample as a whole had average annual family expenses about $399 (43 percent) lower than the stable sample in 1978 (see Table B-6). Those who were new enrollees had particularly low expenses--$447 (48 percent) below the stable sample. In contrast, those who changed from other federal health insurance plans had expenses only $184 (20 percent) below the stable sample.

The accretion sample showed a demographic profile similar to that of the attrition sample. In the case of each of the demographic variables in Table B-3, the difference between the accretion and stable samples is in the same direction but larger than the corresponding difference between the attrition and stable samples. Thus, the contract holders joining the plan are, on average, 11 years younger than those in the stable sample, are only 15 percent as likely to be annuitants, are somewhat more likely to be female, and head families that are about 25 percent smaller. Moreover, these demographic differences were substantially more pronounced among new enrollees, whose expenses were also particularly low, than among those changing from other plans.

As in the attrition analysis above, multiple regression was used to disentangle the effects of demographic variables from accretion as such. The specifications used were similar to those used in the attrition analysis.

The adjustment for demographic differences removed most of the disparity between the expenses of the accretion and stable samples. After adjustment, the accretion sample's expenses were only $44 (5 percent) below those of the stable sample (see Table B-7). This discrepancy was too small to be statistically reliable.

TABLE B-6. ANNUAL MEDICAL EXPENSES OF FAMILIES JOINING THE PLAN IN 1977 AND THOSE IN FOR THE FULL YEAR (In 1978 dollars and percentages)

	In For Full Year (Stable Sample)	All Joining (Accretion Sample)	Changed From Other Plan	New Enrollments
1978 Expenses	931	532	747	484
Dollar Difference from Stable Sample	---	-399	-184	-447
Percentage Difference from Stable Sample	---	-43	-20	-48

TABLE B-7. DIFFERENCES IN EXPENSES BETWEEN ACCRETION GROUPS AND STABLE SAMPLE, BEFORE AND AFTER DEMOGRAPHIC ADJUSTMENT (In 1978 dollars and percentages)

	Group		
	All Joining	Changed From Other Plan	New Enrollments
Before Adjustment			
Dollars	-399	-184	-447
Percent	-43	-20	-48
After Adjustment			
Dollars	-44	+32	-68
Percent	-5	+3	-7

NOTE: A minus (-) indicates that the group had lower expenses than the stable sample.

After adjustment, however, the two accretion groups showed quite different patterns. The expenses of the new enrollees were $68 (7 percent) lower than those of the stable sample, while the expenses of those changing in from other plans were $32 (3 percent) higher than those of the stable sample.

While these differences are too small to be statistically reliable, they suggest that the expenses of the accretion sample may represent two effects: a demographic effect and a "pure" accretion effect. The demographic effect is that those who join the plan tend to be in demographic groups that have lower average expenses. This holds true both of new enrollees and of those who change from other federal plans. The "pure" accretion effect--that is, the effect of accretion after taking the limited demographic differences into account--works in opposite directions for the two groups. The new enrollees have a slight tendency to have low expenses, while those who change from other plans have a slight tendency toward high expenses. In the case of those changing from other plans, this constitutes a form of anti-selection, but it is slight and is more than compensated for by the tendency of those changing from other plans to be from low-expense demographic groups.

How Much Bias Does Accretion Cause Within a Single Year?

The bias caused by accretion within a single year was assessed by the same two methods used to estimate the bias caused by attrition. The higher estimate of bias was obtained by comparing the average expenses of the stable sample to the average of the entire sample, without any adjustment for demographic differences. The smaller estimate of bias was based on the same comparison after adjustment for demographic differences.

Before adjusting for demographic differences, the average expense of the stable sample was $931, or 3.2 percent above the average of $902 in the entire sample. Adjustment for demographic factors reduced this bias to about $3.23, or 0.4 percent.

As noted earlier, the actual bias in any given cross-sectional analysis is probably close to the lower estimate (0.4 percent). This is slightly smaller than the bias caused by attrition. The bias caused by accretion would generally compound the bias caused by attrition, but even the two biases together should have little practical importance in most cases.

THE JOINT EFFECTS OF ATTRITION AND ACCRETION OVER TWO AND THREE YEARS

This section assesses the joint effects of attrition and accretion over two- and three-year periods. These effects are those that occur when moving from a one-year cross-section to two- or three-year longitudinal samples. That is, this section assesses the degree to which attrition and accretion cause two- and three-year samples to differ from a one-year cross section. These attrition effects will cause the results in Chapter III (which includes cross-sectional results as context for longitudinal results) to differ from comparable results in Chapter II (which is entirely cross-sectional).

This aspect of attrition and accretion is assessed by comparing three distributions of expenses, considering both average expenses and the incidence of catastrophic illness. The three distributions are:

- the expenses of all contracts active for a full single year (1978);
- the expenses of all contracts active for two full consecutive years (1977 and 1978); and
- the expenses of all contracts active for three full consecutive years (1976-1978).

The first distribution is identical to that which provided the basis for Chapter II, while the second and third distributions were used in producing Chapter III.

Since these analyses are based on the same data that were used in the body of the report, they differ in several respects from those reported earlier in this Appendix. The sample size is much larger, ranging from 110,000 to 127,000 families. Each year's data are inflated to constant 1982 dollars. Families that left the file during a given year because of a "termination" of coverage were included in the data base for that year, but not for any subsequent year. (This decision was based on the fact that terminations include deaths, and excluding them might create a downward bias in cross-sectional estimates of catastrophic illness. In practice, however, including or excluding these cases has no substantial effect.) Each year's data were weighted to a constant (1980) demographic mix. When multiyear samples were used, each family's weights for all relevant years were averaged. Finally, annuitants were excluded.

The joint effect of attrition and accretion is to raise the estimated average expense in both the two-year and three-year samples (see Table B-8). The size of the bias depends on the year but is, as expected, generally larger in the three-year sample than in the two-year sample. Averaging over 1977 and 1978, the average expense in the two-year sample is $1,177, about 4.2 percent higher than the $1,130 average in the one-year sample. Averaging over 1976, 1977, and 1978, the average expense in the three-year sample is $1,203, about 6.5 percent higher than the average in the one-year sample.

A similar, but less consistent, pattern appears in the incidence of high-cost illness: attrition and accretion bias the estimated incidence upward, but the bias is small (Table B-8). For example, the percentage of families exceeding $5,000 in the one-year sample is 5.2; the comparable percentage in the two-year sample is 5.5 in both years, and it ranges from 5.6 to 5.8 in the three-year sample. At higher thresholds (especially at $20,000), the picture becomes less clear, with the direction of bias caused by attrition and accretion seemingly varying from year to year. As noted in Chapter IV, however, the percentage of families exceeding the higher thresholds increased somewhat over the period from 1976 through 1978 (even after adjusting expenses to a constant average), and this trend is confounded with the effects of attrition and accretion in Table B-8. For that reason, the best estimates of the effect of attrition and accretion on the estimated frequency with which families exceed the highest thresholds is obtained by comparing only the 1978 values in Table B-8. Those values show a small but appreciable and consistent bias, with the bias larger, as expected, in the three-year sample.

EFFECTS OF ATTRITION AND ACCRETION ON ESTIMATES OF HISTORICAL TRENDS

The effects of attrition and accretion on the estimates of historical trends in Chapter IV cannot be assessed precisely but are quite small compared to their effects in the two- and three-year samples.

The principal reason why attrition and accretion bias the estimated trends relatively little is that the trend data are based on five consecutive one-year cross-sections, rather than a single five-year sample. That is, all contracts active for all of 1974 (with minor exceptions) were compared to those active in 1975, then to those active in 1976, and so on. Whether a family left the data base during the period 1975-1978, for example, had

TABLE B-8. AVERAGE EXPENSES AND PERCENT OF FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS IN ONE-YEAR, TWO-YEAR, AND THREE-YEAR SAMPLES, BY YEAR (In 1982 dollars)

Sample (Year)	Average Expense	Percent Exceeding Thresholds			
		$3,000	$5,000	$10,000	$20,000
One-Year					
1978 expenses	1,130	11	5.2	1.7	0.48
Two-Year					
1977 expenses	1,174	11	5.5	1.6	0.43
1978 expenses	1,180	11	5.5	1.8	0.52
Three-Year					
1976 expenses	1,182	11	5.6	1.7	0.41
1977 expenses	1,199	11	5.6	1.7	0.41
1978 expenses	1,227	11	5.8	1.9	0.56

no bearing on its inclusion in the 1974 data base. Accordingly, the attrition and accretion biases (described in the previous section) generated by the use of multiyear samples are not germane.

Moreover, the five cross-sections used in Chapter IV were each weighted to a constant demographic mix. As noted earlier in this appendix, this removes much of the bias caused by attrition and accretion within single years.

HOW WERE ATTRITION-RELATED DEMOGRAPHIC FACTORS CONTROLLED IN THIS REPORT?

Possible attrition and accretion bias attributable to known demographic variables was controlled primarily by weighting each year's data to represent a constant demographic mix: the 1980 population of families with non-elderly heads employed full time and earning at least $7,200 annually (see Appendix A).

The weighting did not include one variable used in the attrition/accretion analysis: annuitant status (employee vs. employee annuitant vs. survivor annuitant). Annuitant status was handled by excluding all annuitants from the analyses. This was done because the annuitant group includes, among others, individuals who, if they had previously been employed in the private sector, would be receiving disability benefits. Since such people are affected by entirely different health policies than the employed population, it was desirable to exclude them. The lack of any method for distinguishing them from other annuitants, however, made it necessary to exclude all annuitants. As a result, the disproportionately low number of annuitants in the attrition and accretion samples cannot cause any attrition- or accretion-related bias.

This weighting process provides better protection against demographically-related attrition and accretion bias in some types of analysis than in others. In cases where various yearly samples are compared, the attrition/accretion effects of the measured demographic variables are entirely removed. An example is the analysis which used separate yearly samples to examine whether catastrophic expenses are becoming more common (Chapter IV). In analyses that could not use the separate yearly samples, on the other hand, some attrition and accretion bias resulting from demographic factors would remain. For example, the analysis of the subsequent expenses of families having catastrophic expenses in a given year (Chapter III) could only be done on a sample consisting of contracts active in both of the years involved. In these analyses, each family weight was usually an average of its weights for each of the two years. This is a less complete control for demographic factors, and some of the attrition/accretion effect discussed above under "Joint Effects of Attrition and Accretion Over Two or Three Years" is thus attributable to demographic factors.

APPENDIX C. EXPENSES OF ATTRITION AND ACCRETION SAMPLES, INCLUDING MENTAL HEALTH CLAIMS

Because the analyses reported in the body of this paper exclude mental health claims, the appropriate way to assess attrition and accretion bias is likewise to exclude mental health claims when describing the characteristics of the attrition and accretion samples. That was the approach taken in Appendix B.

Some have asked, however, whether the characteristics of the attrition and accretion samples would have been different if mental health claims had been included. Although they are not directly pertinent to the question of attrition bias in this report, tables addressing that issue are provided here.

ATTRITION

Inclusion of mental health claims has no substantial effect on the differences between the stable and attrition samples. Thus Tables C-1 and C-2 here are basically the same as Tables B-2 and B-4 in Appendix B. (The claims for all groups are higher in Tables C-1 and C-2, reflecting the addition of mental health expenses.)

ACCRETION

Addition of mental health claims has one effect on the comparisons between the stable and accretion samples. Without mental health claims, those changing into the Blue Cross plan from other plans showed claims about 20 percent lower than the stable sample (Table B-6). After controlling for demographic differences, this group shows expenses very slightly (3 percent) above those of the stable sample. In contrast, if mental health claims are added, this group shows expenses 4 percent above those of the stable sample (Table C-3), and adjustment for demographic differences increases this difference to 15 percent (Table C-4).

TABLE C-1. ANNUAL MEDICAL EXPENSES, INCLUDING MENTAL HEALTH, OF FAMILIES LEAVING THE PLAN IN 1978 AND THOSE REMAINING (In 1977 dollars and percentages)

	All Remaining (Stable Sample)	All Leaving (Attrition Sample)	Changed to Other Plan	Terminated	Other
1978 Expenses	$921	$703	$589	$813	$676
Difference from those remaining	---	-218	-332	-108	-245
Percentage difference from those remaining	---	-24	-36	-12	-27

TABLE C-2. DIFFERENCES IN EXPENSES, INCLUDING MENTAL HEALTH, BETWEEN ATTRITION GROUPS AND STABLE SAMPLE, BEFORE AND AFTER DEMOGRAPHIC ADJUSTMENTS (In 1977 dollars and percentages)

	Group			
	All Leaving	Changed to Other Plan	Terminated	Other
Before Adjustment				
Dollars	-218	-332	-108	-245
Percent	-24	-36	-12	-27
After Adjustment				
Dollars	-94	-234	+118	-195
Percent	-10	-25	+13	-21

TABLE C-3. ANNUAL MEDICAL EXPENSES, INCLUDING MENTAL HEALTH, OF FAMILIES JOINING THE PLAN IN 1977 AND THOSE IN FOR THE FULL YEAR (In 1978 dollars and percentages)

	In for Full Year (Stable Sample)	All Joining (Accretion Sample)	Changed from Other Plan	New Enrollments
1978 Expenses	$1,014	$658	$1,059	$564
Dollar Difference from Stable Sample	---	-356	+45	-450
Percentage Difference from Stable Sample	---	-35	+4	-44

TABLE C-4. DIFFERENCES IN EXPENSES, INCLUDING MENTAL HEALTH, BETWEEN ACCRETION GROUPS AND STABLE SAMPLE, BEFORE AND AFTER DEMOGRAPHIC ADJUSTMENT (In 1978 dollars and percentages)

	Group		
	All Joining	Changed from Other Plan	New Enrollments
Before Adjustment			
Dollars	-356	+45	-450
Percent	-35	+4	-44
After Adjustment			
Dollars	-29	+151	-86
Percent	-3	+15	-8

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APPENDIX D. PROTECTION FROM CATASTROPHIC MEDICAL EXPENSES UNDER EXISTING EMPLOYEE INSURANCE PROGRAMS[1]

Over the past several years, the Congress has considered many proposals to protect people from catastrophically large health-care expenditures. Several of the more recent proposals would guarantee such protection for the employed population by requiring employers to provide insurance limiting individuals' or families' liability for medical expenses to a legally specified maximum. The most recent example is H.R. 850--the Gephardt-Stockman National Health Care Reform Act of 1981; although not requiring employers to offer health insurance, it provides that any such insurance must limit the insured family's liability.

This section examines the effects such a proposal would have on persons with existing employment-related health insurance. Three catastrophic mandates are analyzed that limit the liability of families to $3,500, $2,500, or $1,500 per year, in 1980 dollars. To assess the effects of these three plans, it analyzes the coverage of large expenses under existing insurance in comparison with coverage under the plans. Because of data limitations, the analysis was limited to private, for-profit employers. The major findings are:

- Employees with employment-related coverage now have, on average, good coverage of large medical expenses. For example, the average plan reimburses 92 percent of the covered expenses of an individual with annual expenses between $9,000 and $20,000 (see Table D-1).

- Because of the generally good coverage of large expenses, as well as the rarity of such expenses, none of the catastrophic mandates analyzed here would have a large effect on average benefits or premiums.

- Nonetheless, a relatively small proportion of covered employees--those with high expenses and relatively weak existing coverage--would receive major benefits from a catastrophic mandate.

1. Adapted from Protection From Catastrophic Medical Expenses: The Effects of Limiting Family Liability Under Existing Employee Insurance Programs, Congressional Budget Office Staff Working Paper, (August 1981).

In addition, some catastrophic mandates would provide additional reimbursement to some people with chronic conditions or unstable employment, by eliminating provisions in many current health insurance plans that limit payment for conditions that existed before the beginning of employment.

These conclusions do not necessarily apply to the entire employed population, because the insurance protection of those excluded from this analysis may not be comparable in all cases to that of those included. This analysis reflects the insurance protection of about half of all employees in establishments of 25 or more employees and that of a lower proportion in smaller establishments, as well as of an unknown number of employees covered by virtue of being a spouse or child of one of the employees included in the analysis. The average depth of coverage for all those excluded from the analysis cannot be assessed. The excluded groups include employees with no current protection; some groups, such as agricultural workers, that probably have ayptically weak coverage; and other groups, such as federal employees, that have very thorough protection.

Existing catastrophic coverage is weaker in some industries than in others, but the variation among industries is small. Most are so similar in their average catastrophic coverage that three different measures of the effect of catastrophic mandates--the cost per employee of compliance, the proportion of employees receiving additional reimbursement in a single year, and the value of the additional reimbursement--failed to provide a consistent ranking of industries.

The exception to this pattern of uniformity is the service industry (for example, hotels, repair services, legal services, health services, and social services). This industry has substantially weaker catastrophic coverage under existing insurance and would accordingly be affected more by a catastrophic mandate. The typical cost of compliance in this industry would be from three to four times the average. The proportion of workers in this industry who would receive increased benefits would be three times the average, and the amount of their additional reimbursement would be 30 to 40 percent greater than the average.

An unexpected finding was that the size of existing insurance plans--that is, the number of individuals covered--has little bearing on the adequacy of catastrophic coverage or on the impact of a catastrophic mandate. The largest plans--those with over 25,000 participants--have slightly more thorough coverage of catastrophic expenses and accordingly would have lower costs in complying with a catastrophic mandate. Otherwise, however, the size of the existing plan was found to be largely irrelevant.

TABLE D-1. AVERAGE BENEFIT RATIO AT DIFFERENT LEVELS OF ANNUAL EXPENSE, PLANS OF PRIVATE, FOR-PROFIT EMPLOYERS

Expense Level (1980 dollars)	Number of Workers	Average Annual Expense (dollars)	Average Benefit (dollars)	Average Benefit Ratio[b] (percent)
0	14,732,625[a]	0[a]	0	0
1-100	4,527,230	53	26	49
101-200	3,739,745	146	66	46
201-300	2,110,582	246	128	52
301-400	1,303,969	346	207	60
401-500	822,553	448	292	65
501-600	567,498	548	381	69
601-700	411,276	648	472	73
701-800	325,195	748	567	76
801-900	258,243	851	665	78
901-1,000	258,243	952	770	81
1,001-1,100	188,103	1,052	862	82
1,101-1,200	207,232	1,148	957	83
1,201-1,300	153,033	1,251	1,047	84
1,301-1,400	153,033	1,351	1,150	85
1,401-1,500	137,092	1,453	1,243	86
1,501-1,600	102,022	1,551	1,342	87
1,601-1,700	102,022	1,653	1,438	87
1,701-1,800	102,022	1,753	1,533	87
1,801-1,900	86,081	1,852	1,624	88
1,901-2,000	86,081	1,955	1,732	89
2,001-2,500	325,195	2,241	1,992	89
2,501-3,000	223,173	2,746	2,465	90
3,001-3,500	153,033	3,245	2,939	91
3,501-4,000	121,151	3,745	3,394	91
4,001-4,500	102,022	4,265	3,880	91
4,501-5,000	86,081	4,766	4,351	91
5,001-6,000	121,151	5,475	5,012	92
6,001-7,000	86,081	6,501	5,590	92
7,001-8,000	51,011	7,488	6,863	92
8,001-9,000	35,070	8,493	7,768	91
9,001-10,000	35,070	9,577	8,796	92
10,001-12,500	51,011	11,058	10,159	92
12,501-15,000	35,070	13,689	12,579	92
15,001-17,500	15,941	16,169	14,920	92
17,501-20,000	15,941	18,752	17,186	92
Over 20,000	51,011	33,297	30,433	91
Total	31,881,896	438	364	83

a. An unknown percentage of people with small annual expenses report zero expenses. Therefore, some of those listed as having no expenses should ideally be distributed over the next several intervals. This does not affect estimates of coverage at higher levels.

b. The benefit ratio is the percentage of expenses paid by the insurer.

APPENDIX E. WHO HAS HIGH MEDICAL EXPENSES? THE EFFECTS OF AGE AND SEX

Some families are more at risk of high-cost illness than are others. This Appendix examines the relationships between medical expenses (in 1982 dollars) and the age and sex of the contract holder.

Age

Increasing age produces higher medical expenses, and this is reflected both in families' average annual expenses and in their probability of incurring particularly high expenses.

When the focus is on expenses of entire families, the relationship between age and high-cost illness is complex. For example, one family member may be entering an age of increased vulnerability at the same time that another is entering a time of lowered vulnerability. To simplify these patterns, the following analyses focus on the age of the contract holder.[1]

Average Expenses. Average family expenses increase with age over the entire age range considered. The increase in expenses, however, becomes steadily smaller with increasing age[2] (in Figure E-1, note how the curve "flattens out" somewhat at higher ages).

This pattern reflects more than the simple effect of the aging of the family's members. It also reflects other changes that accompany age, such as changing family size. When three demographic factors (region, sex of contract holder, and family size) are held constant, the effect of age on average expenses is

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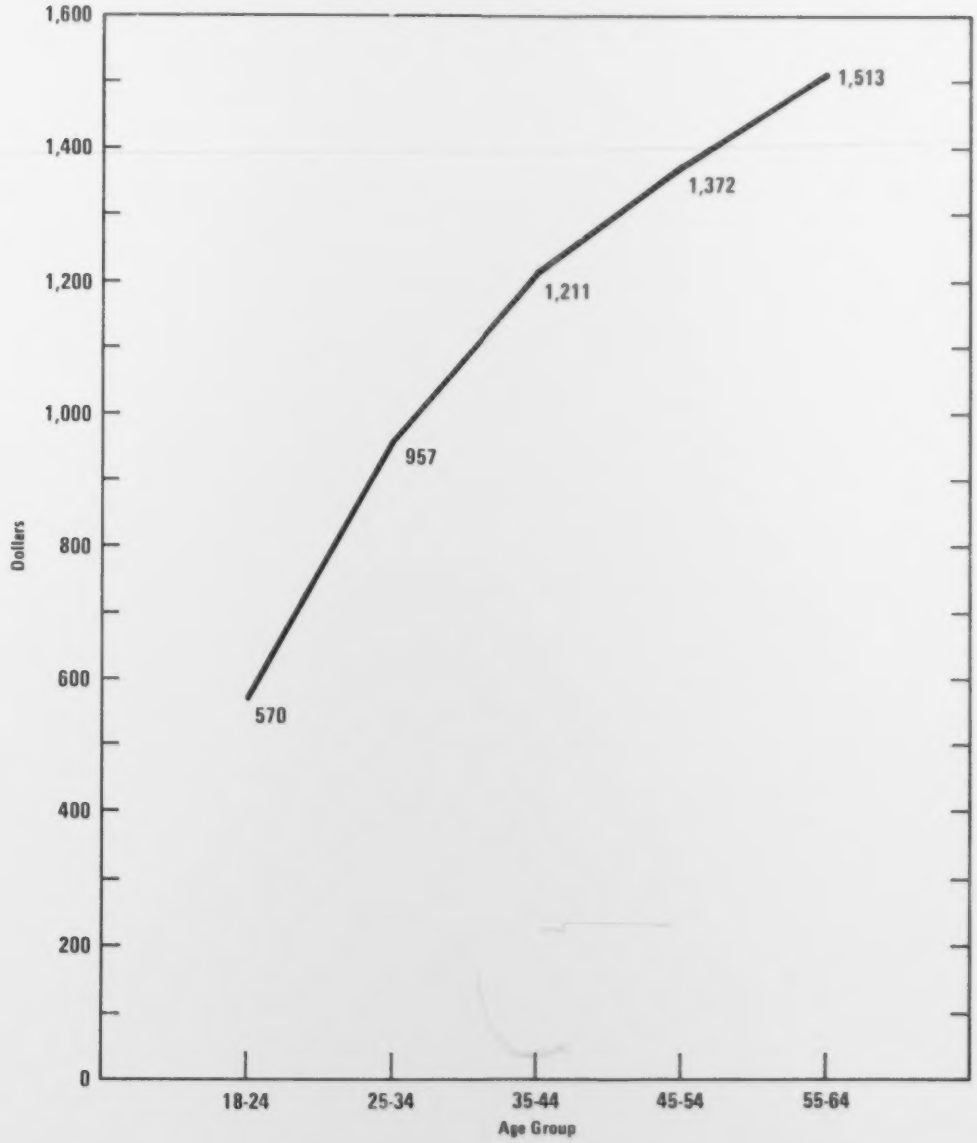
1. Because the age of the contract holder is not a simple measure of age, it is less strongly related to expenses than is the age of individual people. Thus, when the analyses described below were repeated with only self-only contracts included, the relationships between age and expenses were found to be generally stronger than those reported below.

2. It is important to recall that this analysis does not consider the elderly, and the pattern described here may not apply to ages over 65.

Figure E-1.

Annual Expenses by Age of Contract Holder



very different: expenses decline between the 25-34 and 35-44 age groups but increase both before and after those ages (see Figure E-2).

The Frequency of High-Cost Illness. Age also increases the incidence of high-cost illness. In proportional terms, the increase in particularly pronounced when higher thresholds are used (see Table E-1). For example, the proportion of families exceeding a $5,000 threshold almost doubles between the 25-34 and 55-64 age groups, and the proportion exceeding a $20,000 threshold increases four and a half times over that same age interval.

The effect of age on the incidence of high-cost illness is not consistent across the age range, and it varies depending on the threshold of expenses. As a general rule, the higher the threshold, the older the age at which the most rapid increase in high-cost illness occurs. For example, if a $3,000 threshold is used, the most rapid increase in the incidence of high-cost illness occurs between the 18-24 and 35-44 age groups (Table E-1). In contrast, if a $20,000 threshold is used, the most rapid increase occurs after the age of 44. This is shown graphically in Figure E-3: the incidence using a $5,000 threshold slopes up sharply at the younger age ranges, while the incidence using a $20,000 threshold slopes upward most sharply at the upper end of the age distribution. The pattern using a $10,000 threshold is intermediate.

TABLE E-1. PERCENT OF FAMILIES EXCEEDING THRESHOLDS OF ANNUAL EXPENSE, BY AGE OF CONTRACT HOLDER

Level of Expense	Age Group				
	18-24	25-34	35-44	45-54	55-64
$ 1,000	14	23	27	26	26
$ 3,000	5.7	9.6	12	12	13
$ 5,000	2.1	4.0	5.7	6.8	7.5
$10,000	0.58	0.99	1.6	2.3	3.3
$20,000	0.20	0.25	0.32	0.72	1.11

Figure E-2.

Expenses by Age of Contract Head, Controlling for Sex, Family Size, and Region

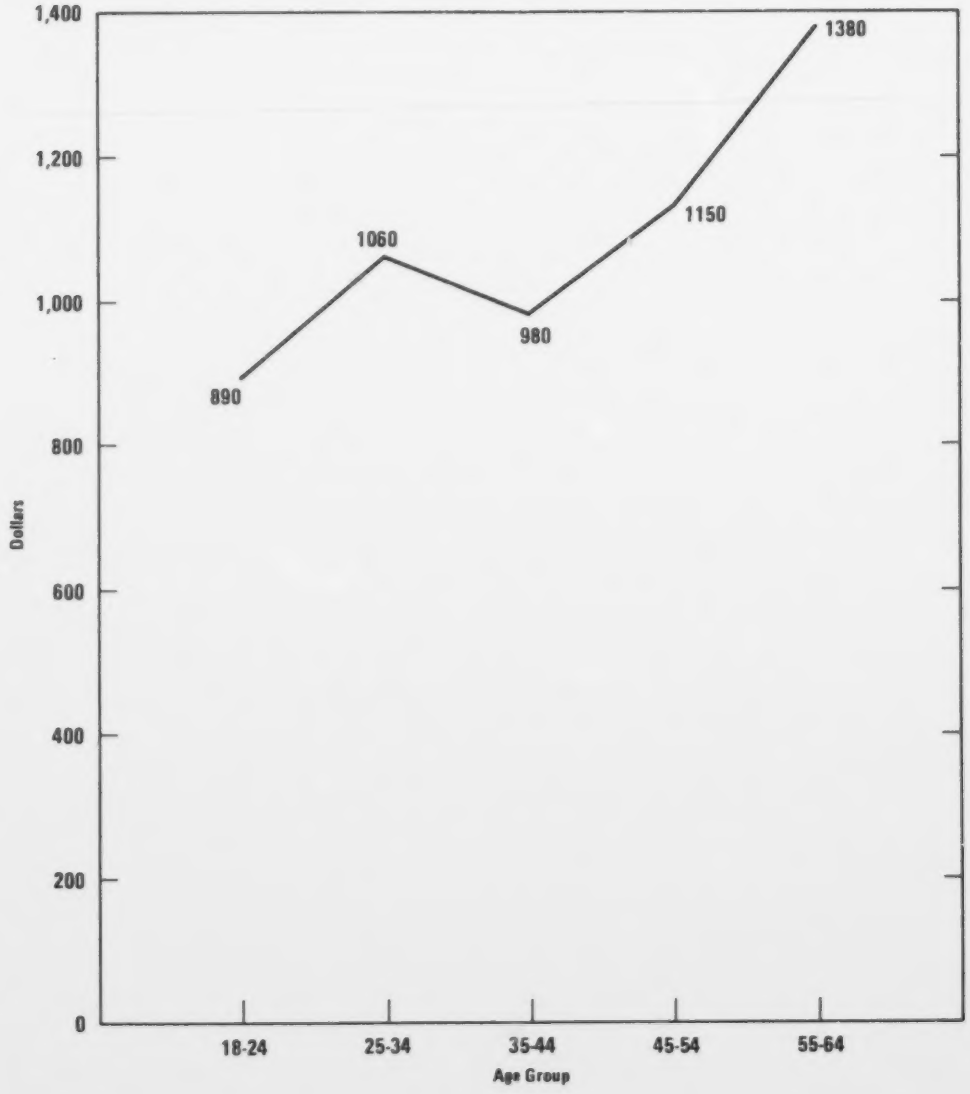
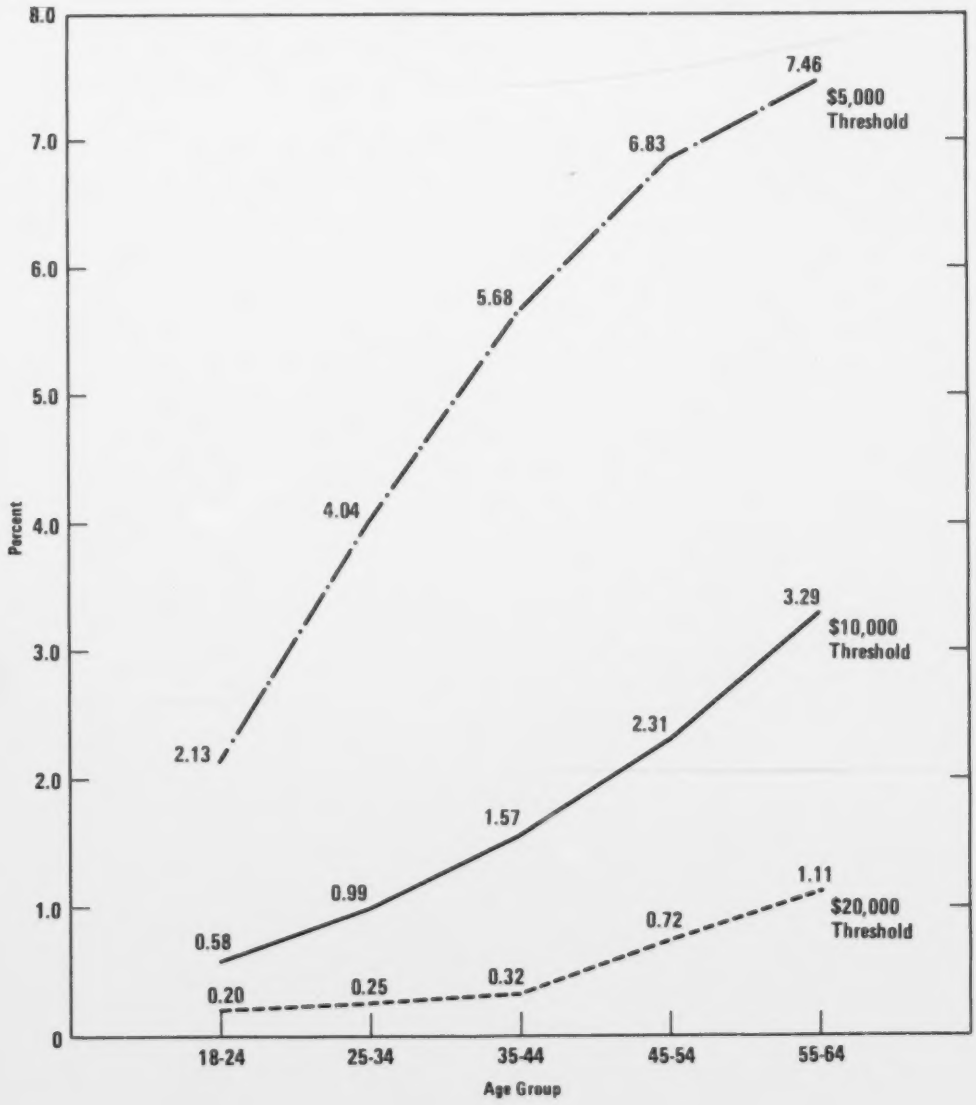


Figure E-3.

Percent of Families Exceeding Catastrophic Thresholds in 1978 by Age and Level of Catastrophic Threshold (In 1982 dollars)



Sex

Gender has important effects on expenses claimed under self-only contracts, affecting both average expenses and the incidence of catastrophic illness. Women have higher average expenses than men and are more likely to have moderately high expenses, but men and women are equally likely to have very high expenses (see Table E-2). This pattern, however, varies with

TABLE E-2. PROPORTION OF SELF-ONLY CONTRACTS EXCEEDING THRESHOLDS OF ANNUAL EXPENSE, BY SEX

Level of Expense	Male	Female
$ 298[a]/	13.1	21.6
$ 502[b]/	9.2	16.8
$ 1,000	5.4	11.2
$ 3,000	2.3	4.5
$ 5,000	1.1	2.2
$10,000	0.5	0.6
$20,000	0.1	0.1

a. Male average

b. Female average

age. At younger ages, males have substantially lower average expenses than women and are markedly less likely to exceed the lower ($3,000 and $5,000) thresholds. Their expenses rise more rapidly with increasing age than those of women, however, and by the 55-64 age group, the average expense of males slightly exceeds that of females. By the 55-64 age group, males also show a tendency toward a higher incidence of high-cost illness.

The data used here do not clarify the reason for this pattern, but it may stem in part from two factors: maternity expenses, and the higher mortality of males. Maternity would routinely result in annual expenses over $3,000, and annual expenses over $5,000 are not rare. This would contribute to both the higher average expense and the higher incidence of moderately high-cost illness among women in the age groups below 45.[3] The higher mortality rate of males may push the expenses of males above those in females in the oldest age group.

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3. Maternity claims are presumably underrepresented in the self-only contracts shown in Table E-2. Unfortunately, the data do not permit a comparable analysis of differences among all individuals in the data, because in the case of family contracts, records are available only for individuals who have filed claims. Comparable analyses were conducted, however, including all individuals who had filed claims. These analyses had the advantage of including all maternity claims, but they had the weakness of masking sex differences in the frequency with which people filed no claims at all. The results were largely comparable to those reported above.

APPENDIX F. THE EFFECTS OF USING INDIVIDUAL RATHER THAN FAMILY THRESHOLDS

The role of individuals in high-cost illness is perhaps most directly relevant to policy in deciding how to structure health insurance to provide protection against the financial burden of high-cost illness. Although most recent insurance proposals have focused on the expenses of entire families, a plan could also be based on the expenses of individuals.

In order to assess the different effects of these two aproaches, the same four thresholds used throughout this paper were applied to all individuals in the sample. That is, each individual's expenses were tabulated separately, regardless of family membership. This mirrors a catastrophic insurance plan in which eligibility would be based on the expenses of individuals, and only the expenses of the individual exceeding the threshold (rather than the expenses of the individual's whole family) would be included in calculating the amount of expenses considered "catastrophic."

The effect of substituting individual for family thresholds would be to reduce both the number of catastrophic cases and total catastrophic expenses, but the catastrophic expense per case would generally increase (see Table F-1). The decrease in the number of catastrophic cases would be sizable, ranging from 12 to 19 percent. Since high-cost illness is often largely a result of the expenses of a single family member, the other family members excluded from consideration by the use of an individual threshold would often have relatively low expenses. Accordingly, much of the decrease in the number of catastrophic cases caused by using an individual threshold would be due to the exclusion of families that would exceed the family threshold by a relatively small amount, and those that would remain under an individual threshold would tend to be the higher-cost cases. Thus, using all but the lowest of the four thresholds, the catastrophic costs per case would actually increase 3 to 5 percent if an individual threshold was used, even though the expenses of other family members would not be considered. Since costs per case would increase, total "catastrophic costs"--that is, total expenses above the threshold--would decrease slightly less than the number of catastrophic cases--about 12 to 17 percent.

TABLE F-1. EFFECTS OF SUBSTITUTING INDIVIDUAL FOR FAMILY THRESHOLDS, BY LEVEL OF THRESHOLD (In percent change)

	$3,000	$5,000	$10,000	$20,000
Cases Exceeding Threshold	-12.3	-18.8	-17.6	-14.8
Average Expenses in Excess of Threshold (per case)	-4.4	+2.8	+4.7	+3.7
Total Expenses in Excess of Threshold (all cases)	-16.1	-16.5	-13.8	-11.6

Even though substituting an individual threshold for a family threshold would have only moderate effects on aggregate catastrophic costs, it would have a very large effect on the financial burden experienced by some high-cost families. The additional burden would be greatest for families with no single family member over the threshold (who would receive no protection using an individual threshold) and other families with a relatively small proportion of expenses attributable to one family member. The decline in benefits would depend on several factors--the specific provisions of the plan; the family's other insurance, if any; the

family's total expenses; and so on--but could be several times as large as the aggregate change in catastrophic costs.[1]

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1. For example, consider a catastrophic insurance plan that limited cost-sharing to $3,000 per year. For simplicity, consider a family that has the minimum insurance--100 percent cost-sharing up to $3,000 and 0 percent cost sharing thereafter. Assume that the family had $7,223 in expenses (the average for families exceeding a $3,000 family threshold) and that 75 percent of their expenses were attributable to one family member. (Twenty-three percent of families with expenses above $3,000 have that degree--or less--of concentration of expenses in one individual.) If a family threshold was applied, their cost sharing would be $3,000. If an individual threshold was applied, their cost sharing would increase 60 percent, to $4,806. (They would pay $3,000 in cost sharing for the one high-cost individual, whose expenses would be 0.75 x $7,223 = $5,417. The expenses attributable to other family mmebers would be 0.25 x $7,223 = $1,806. Since this is below $3,000, no additional family members could reach the cost-sharing limit. Total cost sharing would therefore be $3,000 + $1,806 = $4,806.) More extreme cases would also occur.

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APPENDIX G. HIGH-COST ILLNESSES THAT OVERLAP THE END OF A CALENDAR YEAR: THE EFFECTS OF ALTERNATIVE INSURANCE PROVISIONS

This paper, paralleling many catastrophic insurance proposals, defined high-cost illness by whether expenses incurred within a calendar year exceed a specific threshold. Some high-cost illnesses, however, fail to meet this criterion or are more burdensome than this criterion would indicate. This happens when the relevant expenses are incurred over a period that extends beyond the ends of a calendar year.

One case in which this occurs is when expenses are unusually high but are not concentrated within a single calendar year. For example, a family may have expenses that are atypically high for two or more years but are just below the threshold in any one year. Such an illness would not be classified as catastrophic, even though a considerably less expensive illness extending over a shorter period of time could be. A second case is illnesses that produce expenses in excess of a threshold within a 12-month period but that occur partly in one calendar year and partly in the next. A third case is illnesses that produce expenses above the threshold in one calendar year and unusually high expenses that nonetheless fail to exceed the threshold in the subsequent year. Because of the financial drain of the medical expenses in the first year, subsequent expenses that are high but below the threshold could be as burdensome as the higher expenses in the first year, but they would not be classified as catastrophic using a calendar-year criterion.

This Appendix analyzes several aspects of high-cost illnesses that do not neatly fit into the boundaries of calendar years. The major finding is that a sizable proportion of high-cost illnesses extend into more than one calendar year, and focusing entirely on expenses within calendar years would lessen costs transferred to others, but at the price of excluding some high-cost families from benefits under a catastrophic insurance plan and reducing the benefits that some families would receive.

EXPENSES EXTENDING OVER PARTS OF TWO YEARS

Some high-cost illnesses are largely or entirely confined to a 12-month period but will nonetheless not push the affected

family over the catastrophic threshold in any calendar year, because the period of illness straddles the end of the year. To assess the extensiveness of this problem, this section considers the additional families that would exceed a catastrophic threshold if they were free to use any consecutive 12 months to accumulate expenses--that is, if they were freed from the constraint of using calendar years to tabulate expenses. To analyze this, expenses over two calendar years are considered, and high-cost families are divided into three groups: those who exceed a given catastrophic threshold in only one of the two years, those who exceed it in both calendar years, and those who fail to exceed it in either year but do exceed it over a twelve-month period that is partly within each year.

Depending on the threshold, between 80 and 83 percent of high-cost families exceed the threshold in only one of the two calendar years (see Table G-1). An additional 5 to 15 percent exceed the same threshold in both of the two years. (These latter are, on average, a particularly high-cost group. Given any threshold, the average expenses within either calendar year of this group are considerably higher than the average expenses of the families that exceed that threshold only in that year.) Accordingly, the great majority of families who exceed a catastrophic threshold within a 12-month period (from 88 to 95 percent, depending on the threshold) will exceed the threshold even under a calendar-year constraint.

From 6 to 12 percent of families exceeding the threshold within a 12-month period fail, however, to exceed the threshold under a calendar-year constraint. In general, the higher the threshold, the higher the proportion of high-cost families who are excluded by this constraint.[1]

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1. These numbers are an assessment of the extent of the problem but are not an estimate of the impact of removing the calendar-year constraint from a catastrophic insurance plan. That impact would depend both on the specific provisions of the plan and on the decisions of high-cost families. Moreover, the impact in the first year would probably differ from the impact in subsequent years, since some families would lose eligibility in one calendar year because of having applied some of that year's expenses toward the previous year's total.

TABLE G-1. FAMILIES EXCEEDING CATASTROPHIC THRESHOLDS WITHIN TWELVE CONSECUTIVE MONTHS OVER A TWO-YEAR PERIOD, WITH AND WITHOUT CALENDAR-YEAR CONSTRAINT, BY THRESHOLD

	$3,000	$5,000	$10,0000	$20,000
Total (thousands)	9,212	4,930	1,574	453
Exceed in one calendar year only (percent)	80	80	81	83
Exceed in both calendar years (percent)	15	10	8	5
Exceed in neither calendar year (percent)	6	10	11	12

NOTE: Components may not sum to 100 percent because of rounding.

In addition to limiting the number of families exceeding the threshold, a calendar-year constraint affects the average expenses of high-cost families in two ways. Some of the families that exceed the threshold even with the calendar-year constraint could increase the amount of their expenses that would be considered above the threshold if they were free to choose whatever 12 consecutive months maximized their expenses. Accordingly, under a catastrophic insurance plan that reimbursed all expenses above a threshold, removing a calendar-year constraint would substantially increase some families' reimbursement. On the other hand, those families who would exceed the threshold only in the absence of a calendar-year constraint would have, on average, somewhat lower expenses than the families that exceed the threshold with the constraint. This is because the higher a family's expenses relative to a given threshold, the less likely it is that the loss of some high-cost months because of a calendar-year restriction would push it below the threshold. Given these two factors, the net effect on average reimbursable expenses of removing a calendar-year constraint from a catastrophic insurance plan would largely depend on the specific plan involved. It is likely, however, that average reimbursements would not change greatly, although more families would be reimbursed.

EXPENSES CONTINUING AFTER THE END OF A HIGH-COST YEAR: CARRY-OVER PROVISIONS

Some families that exceed a catastrophic threshold in one calendar year continue to have expenses that are unusually high, but below the level of the threshold, in the subsequent year. The prevalence of this problem can be assessed by examining the effect of "carry-over provisions." These are provisions that would apply a more lenient criterion than the catastrophic threshold in determining which families remain "high-cost" the year after exceeding the threshold. In a catastrophic insurance plan, such a provision would allow some additional families to "carry over" their eligibility for benefits into the subsequent year.

To assess the prevalence of high-cost families whose subsequent expenses are high but below the threshold, two steps are required. First, the number of high-cost families who would continue to be classified as high-cost under various carry-over provisions is ascertained. Second, this number is compared to the number of high-cost families who would remain high-cost the subsequent year even without a carry-over provision (that is, by exceeding the catastrophic threshold again in the subsequent year).

One simple type of carry-over provision, called an "annual carry-over" here, would set a second-year threshold that is lower than the normal threshold. For example, families that exceed a $10,000 threshold in one year could be required only to exceed half that amount in the following year. The threshold would be set at a lower level the second year to avoid having families bear the burden of a catastrophic deductible two years in succession.

A second type of carry-over provision, called a "quarterly carry-over" here, would require that the family maintain the lower level of expense for only a portion of the following year--for example, one calendar quarter. In this case, the level of expenses required by the carry-over would be divided among the four calendar quarters of the subsequent year. A provision of this sort was incorporated into the Long-Ribicoff catastrophic bills (most recently, S. 350, 96th Congress).[2]

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2. The carry-over levels discussed here all correspond to either one-half or three-fourths the annual rate of expenditures reflected in the relevant catastrophic threshold. In the case of annual carry-overs, this means simply imposing a second-

(Continued)

Annual Carry-Over Provisions

In general, imposing a threshold in the second year that is one-half the normal threshold would increase the proportion of high-cost families that would continue to receive benefits in the absence of any carry-over provision by two-thirds to three-fourths (Table G-2). The exception is the lowest threshold ($3,000). In that instance, the effect of the carry-over would be somewhat smaller. The more stringent carry-over level (three-fourths of the threshold amount) would increase the proportion continuing to receive benefits less than half as much as much as would the more lenient carry-over.

The proportion of high-cost families that would be afforded continued protection by an annual carry-over provision would decline markedly as higher thresholds were used. (This parallels the fact that the higher the threshold used, the smaller is the proportion of high-cost families that exceed the threshold again in the subsequent year.) For example, 42 percent of families exceeding a threshold of $3,000 would exceed a carry-over level of one-half the threshold ($1,500) the next year (see Table G-2). Only half that proportion (21 percent) of families exceeding a threshold of $20,000 would exceed the corresponding carry-over level ($10,000). If the carry-over was set at the more stringent level of three-fourths of the threshold, fewer high-cost families would exceed the carry-over, but the proportion would decline similarly as the threshold was raised.

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2. (Continued)
year threshold that is either one-half or three-fourths as great as the generally applied threshold. In the case of quarterly thresholds, these amounts are further divided between the four quarters. Accordingly, a quarterly carry-over set at one-half the annual rate of expenditures reflected in the general threshold requires expenses equal to one-eighth the general threshold in each quarter.

In the quarterly carry-over provisions analyzed here, expenses must exceed the carry-over level in each calendar quarter with no interruption if the family is to maintain catastrophic status. Only those families that exceed the quarterly carry-over level in the first quarter are potentially eligible in the second; only those who exceed it in both the first and second quarters are potentially eligible in the third; and so on. Accordingly, the proportion of high-cost families exceeding the carry-over level necessarily drops from each quarter to the next.

TABLE G-2. HIGH-COST FAMILIES RECEIVING BENEFITS IN SUBSEQUENT YEAR, WITH AND WITHOUT ANNUAL CARRY-OVER PROVISION, BY THRESHOLD (In percent of high-cost families)

	$3,000	$5,000	$10,000	$20,000
Without Carry-over[a]	27	20	18	12
With Annual Carry-over				
Three-fourths of threshold	33	27	23	16
One-half of threshold	42	35	30	21

a. High-cost families exceeding same threshold in subsequent year.

Application of an annual carry-over provision would also increase the benefits received by all high-cost families that exceed the carry-over level. In some cases, the increase in benefits would be dramatic. For example, with a $20,000 threshold, a family with expenses of $25,000 in the subsequent year would have $5,000 in expenses above the threshold--and therefore be eligible for reimbursement--that year. In contrast, under the more lenient of the carry-over provisions, their expenses eligible for reimbursement would triple, to $15,000.

The aggregate effect of a carry-over provision on benefits and costs, however, would be less striking than this example, although still large. For example, of the 724,000 families exceeding a $10,000 threshold in one year, about 127,000 (18 percent) would exceed $10,000 in the subsequent year as well (see Table G-3). About 165,000 (30 percent more) would exceed the relatively strict carry-over requirement of $7,500, and about 220,000 (73 percent more) would exceed the more lenient carry-over level of $5,000. Total expenses eligible for reimbursement--that is, total expenses above the required level, whether the threshold or the carry-over level--would be increased by somewhat smaller percentages if a carry-over provision was applied. Total expenses above the required level would increase 25 percent with the stricter carry-over and 57 percent with the more lenient.

TABLE G-3. EFFECTS OF DIFFERENT ANNUAL CARRY-OVER PROVISIONS ON BENEFITS AND COSTS, USING A $10,000 THRESHOLD (In 1982 dollars)

	Carry-Over Provision		
	None[a]	Strict[b]	Lenient[c]
Families Remaining Above Required Level[d] (thousands)	127	165	220
Percent change	---	+30	+73
Average Expenses Above Required Level	11,599	11,152	10,537
Percent change	---	-4	-9
Total Expenses Above Required Level (millions)[e]	1,473	1,840	2,318
Percent change	---	+25	+57

a. Families must exceed $10,000 threshold in second year.

b. Families must exceed $7,500 carry-over in second year.

c. Families must exceed $5,000 carry-over level in second year.

d. Threshold or carry-over level.

e. These numbers are for comparative purposes and do not directly correspond to the cost of similar catastrophic insurance plans. Those costs would depend on many factors, such as the segments of the population included in the plan.

One factor underlying this pattern is that average family expenses above the required level would actually decline slightly if a carry-over provision was applied. This decline would occur with any of the thresholds except for $20,000. The application of a carry-over provision extends protection to a substantial number of families with expenses only slightly above the carry-over. In calculating average reimbursable expenses, this roughly offsets the dramatic increase in reimbursable expenses for many families that exceed the required level even without a carry-over provision.

Quarterly Carry-Over Provisions

The effects of the quarterly carry-over provisions would be quite similar regardless of the threshold or the carry-over level used. A sizable percentage of high-cost families exceed the carry-over level in the first calendar quarter, but this percentage drops very rapidly over the remainder of the year.[3] Even in the first quarter, however, the proportion of families exceeding the quarterly carry-over level would often be lower than the proportion exceeding the corresponding annual carry-over level.

The higher the threshold used, the lower the proportion of families that would exceed the carry-over level, but the variation from threshold to threshold would be quite small (see Table G-4). Similarly, applying the more stringent rather than the more lenient carry-over level would necessarily lower the proportion of high-cost families that would exceed the carry-over level, but it would not alter the pattern of a rapid decline in the proportion exceeding the carry-over level during the second through fourth calendar quarters. That the pattern of decline would be similar in all cases is shown graphically in Figure G-1. The top two lines, which are almost identical to each other, represent the proportion of high-cost families exceeding the lower carry-over level for $5,000 and $10,000 thresholds. The lower two lines, which parallel the top two but are slightly lower, represent the more stringent carry-over for the same thresholds. Accordingly, any one carry-over level can serve as an example.

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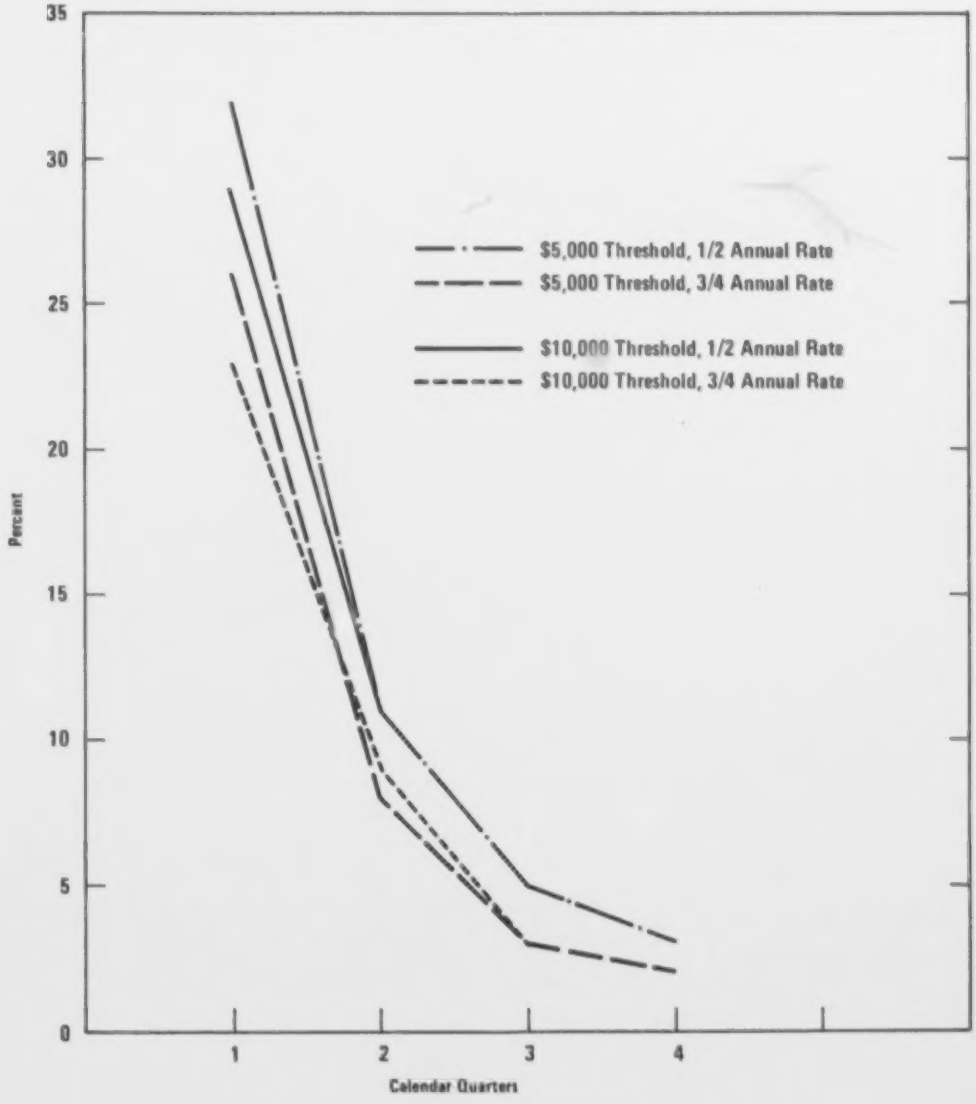
3. As already noted, families would have to exceed the carry-over in each calendar quarter without interruption to remain eligible.

TABLE G-4. PERCENT OF HIGH-COST FAMILIES EXCEEDING QUARTERLY CARRY-OVER LEVELS IN EACH QUARTER OF THE SUBSEQUENT YEAR, BY THRESHOLD AND CARRY-OVER LEVEL (Using 1982 dollars)

	Calendar Quarter			
	1	2	3	4
$3,000 Threshold				
1/2 annual rate ($375 per quarter)	33	12	6	3
3/4 annual rate ($563 per quarter)	28	9	4	2
$5,000 Threshold				
1/2 annual rate ($625 per quarter)	32	11	5	3
3/4 annual rate ($938 per quarter)	26	8	3	2
$10,000 Threshold				
1/2 annual rate ($1,250 per quarter)	29	11	5	3
3/4 annual rate ($1,875 per quarter)	23	9	3	2
$20,000 Threshold				
1/2 annual rate ($2,500 per quarter)	25	8	3	3
3/4 annual rate ($3,750 per quarter)	18	6	1	1

Figure G-1.

Percent of High-Cost Families Exceeding Quarterly Carryover Levels During Subsequent Year, by Threshold and Carryover Level



If a $10,000 threshold was in use and the more stringent carry-over level was applied,[4] 23 percent of high-cost families would exceed the carry-over level in the first quarter of the subsequent year (see Table G-4). During the second quarter, however, only 9 percent would exceed the carry-over level, and by the fourth quarter, the percentage would drop to 2 percent.

Quarterly Carry-Overs Compared to Annual Carry-Overs

Annual carry-over provisions would offer more protection to high-cost families than would the corresponding quarterly carry-overs, in two respects. First, when thresholds are low, annual carry-overs would generally extend protection to a higher proportion of high-cost families than would be protected by a quarterly carry-over, even during the first quarter of the next year (see Table G-5). This is most striking with a $3,000 threshold and the more lenient carry-over level of one-half of the threshold. Under those circumstances, an annual carry-over provision would extend protection to 42 percent of high-cost families, while a quarterly carry-over would protect only 33 percent during the first quarter. At higher thresholds, however, this difference would be smaller, and at a $20,000 threshold, annual carry-overs would protect a slightly smaller proportion of high-cost families than would be protected in the first quarter by a quarterly carry-over (see Table G-5).

Second, annual carry-overs would extend protection for a longer time than would quarterly carry-overs. For this reason, annual carry-overs would offer more protection in aggregate than would quarterly carry-overs, even at high thresholds. For example, with a $20,000 threshold and a carry-over set at three-fourths of the threshold, an annual carry-over would offer a full year of extra protection to 16 percent of high-cost families (see Table G-5). A quarterly carry-over would offer one quarter of extra protection to 18 percent (see Table G-5), but it would offer a half year's protection to only 6 percent, and a full year's protection to only 1 percent (see Table G-4).

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4. As noted earlier, the more stringent criterion would require quarterly expenses corresponding to annual expenses three-fourths as great as the threshold. Accordingly, for a $10,000 threshold, the more stringent carry-over would require expenditures of $1,875 per quarter ($10,000 x 3/4 ÷ 4 quarters).

TABLE G-5. PERCENT OF HIGH-COST FAMILIES EXCEEDING ANNUAL AND QUARTERLY CARRY-OVER PROVISIONS, BY THRESHOLD AND CARRY-OVER LEVEL (Using 1982 dollars and percent exceeding quarterly carry-over in the first quarter)

Carry-Over Level	Threshold			
	$3,000	$5,000	$10,000	$20,000
1/2 Annual Rate				
Annual	42	35	30	21
Quarterly	33	32	29	25
3/4 Annual Rate				
Annual	33	27	23	16
Quarterly	28	26	23	18

The greater protection that would be afforded to many families by annual carry-overs relative to quarterly carry-overs is likely to be a result of the uneven rate at which expenses accrue. Illnesses are often episodic, and, even when they are not, the rate at which services are used can fluctuate dramatically. Accordingly, a high-cost family that continues to include a seriously ill family member and that continues to generate high annual expenses may nonetheless have temporarily low expenes over one or two calendar quarters. Families following this pattern would exceed an annual carry-over but would fail at some point to exceed a quarterly carry-over, in some cases during the first calendar quarter of the subsequent year.[5]

5. An example from the data used here of the episodic nature of some medical expenses is provided by a family in which the mother was chronically ill with cancer. This family illustrates how a family that exceeds a $10,000 threshold in the baseline year can fail to exceed a quarterly carry-over while exceeding an annual carry-over. In the baseline year (1976), the family had expenses of $16,300, of which $15,400 was attributable to the mother, who had surgery three times during the year. In the first ten months of 1977, however, the mother's expenses were relatively trivial, amounting to about $300, and no one else in the family filed any claims. Accordingly, the family would not have exceeded even the more

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Not all high-cost families, however, would fare better under an annual than under a quarterly carry-over. For example, consider a high-cost family that has high expenses in the first quarter of the subsequent year, but few expenses thereafter. Assume that the threshold is $10,000 and the family's expenses were $8,000 during the first quarter of the next year and $1,000 during the remainder of the year. Under the more stringent annual carry-over, the family's $9,000 in expenses during the subsequent year would be subject to a $7,500 deductible,[6] and their expenses eligible for reimbursement would be $1,500. Under the corresponding quarterly carry-over, their $8,000 in expenses during the first quarter would be subject to a $1,875 deductible,[7] leaving $6,125 eligible for reimbursement.

LONGER-TERM EXPENSES BELOW THE CATASTROPHIC THRESHOLD

A third group of high-cost families who are not classified as high-cost when only calendar-year expenses are considered are those who have longer-term expenses that are atypically high but fail to exceed the threshold in any one calendar year. One way to assess the extensiveness of such cases is to examine the effects of extending a calendar-year threshold to two calendar years. Under such an extended deductible, families could consider two full calendar years of expenses in meeting the threshold.

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5. (Continued)
lenient quarterly carry-over. During the last two months of 1977, the mother again underwent surgery, generating an additional $5,200 in expenses. On the strength of her claims alone, the family would have exceeded the lower annual carry-over level ($10,000 x 1/2 = $5,000). In addition, the father had thyroid surgery in December, 1977. As a result, the family's expenses in 1977 totalled $9,369, sufficient to exceed even the more stringent carry-over ($10,000 x 3/4 = $7,500), but not sufficient to again exceed the $10,000 threshold.

6. $10,000 x 3/4 = $7,500.

7. $10,000 x 3/4 ÷ $1,875.

Extending a calendar-year threshold to two years (without doubling the required expenses) would increase the number of families classified as high-cost by 20 to 45 percent, depending on the threshold (see Table G-6). Nearly a third of this increase, however--from 6 to 12 percent--would be a result of lifting the calendar-year constraint in tabulating each year's expenses (discussed above). That is, extending a threshold to two years also would allow families whose expenses exceed the threshold during a 12-month period that does not coincide with a calendar year to qualify as high-cost. The remainder of the increase in high-cost families--from 14 to 34 percent--would represent the families whose costs are high but fail to exceed the threshold in any 12-month period during the two years.

TABLE G-6. FAMILIES EXCEEDING THRESHOLD WITH AND WITHOUT EXTENSION OF THRESHOLD TO TWO CALENDAR YEARS, BY THRESHOLD

	$3,000	$5,000	$10,000	$20,000
Without Extension[a] (thousands)	8,679	4,446	1,397	401
With Extension (thousands)	10,457	6,011	2,028	573
Total percent increase	20	35	45	43
Percent increase from lifting calendar-year exclusion	6	10	11	12
Additional percent increase	14	25	34	31

a. Over two-year period. Includes families exceeding threshold in either or both years.